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ELECTRICAL WORLD

OCTOBER 17, 1931
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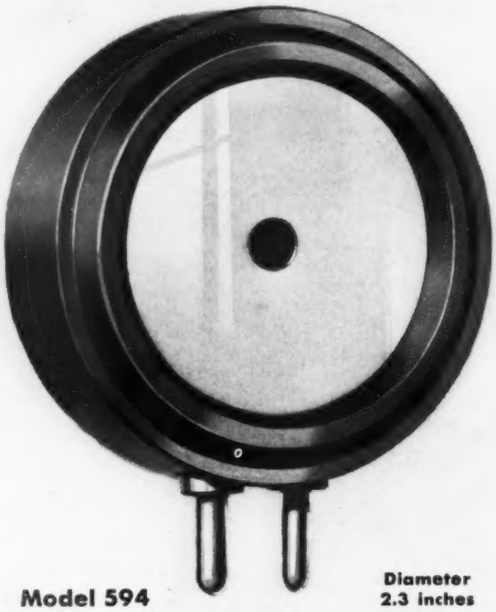

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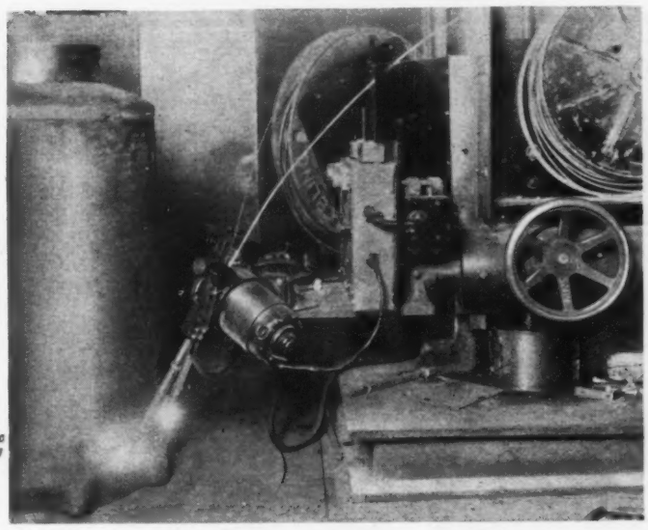

Automatic tank welding

OCTOBER 17, 1931

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McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

CHICAGO, 520 N. Michigan Ave.

CABLE ADDRESS: "MACHINIST, N. Y."

Aldwych House, Aldwych
LONDON, W.C. 2

883 Mission St., SAN FRANCISCO

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Published weekly. $5 per year. 25 cents per copy. Entered as second-class matter, January 26, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Member A.B.P. Member A.B.C.

NUMBER OF COPIES PRINTED THIS ISSUE, 16,940

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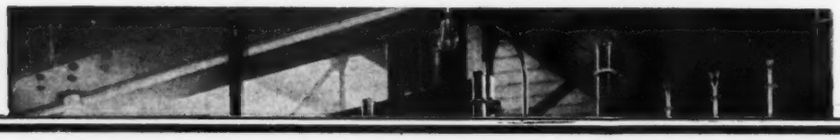
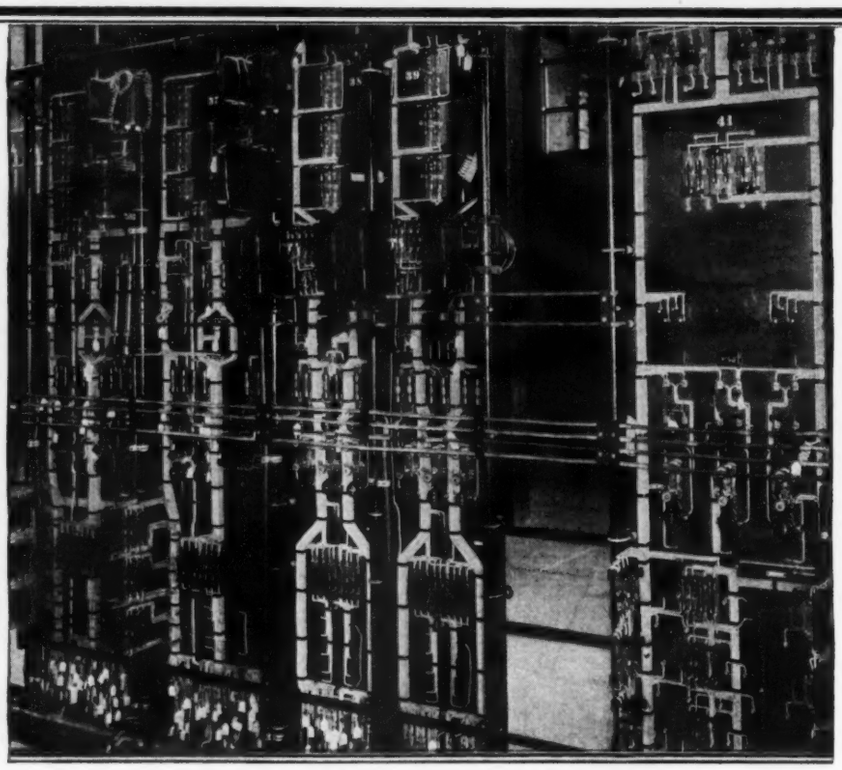


THE JOB THAT MUST BE PERFECT



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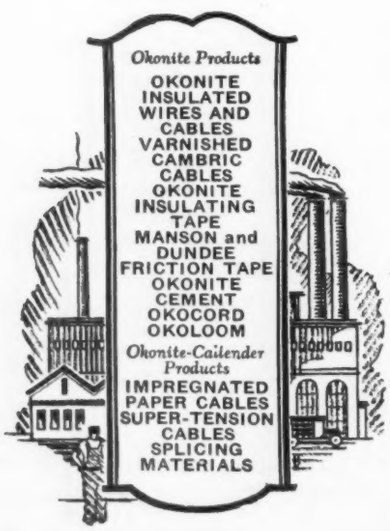

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ELECTRICAL WORLD

for the Week Ending

October 17, 1931

Modern lighting at its best is barely emerging from its primitive stage.

M. LUCKIESH,
Director
Lighting Research Laboratory,
General Electric Company

—**The financial relationship** between the Standard Gas & Electric Company and H. M. Byllesby & Company, as described by the Federal Trade Commission's economist, involves testimony covering deduction of "commissions and brokerage charges" in stock-selling transactions—*p. 676.*

—**A "voltage-chasing" scheme** applied to low-voltage services in the James H. Reed station at Pittsburgh insures continuous supply to the turbine and boiler rooms and lighting banks—*p. 688.*

—**Rural lines at $500 a mile,** everything included, are held by utility expert to be good enough for practical purposes. State commissioner would "sell" the farmers on community basis.—*pp. 690 and 696.*

Another politico-utility issue looms

—**New York State clamors hard** for direct inclusion in negotiations with Canada over St. Lawrence water power. Will this prove another Boulder Dam fight, with the Empire State in the rôle of Arizona?—*p. 674.*

—**"New Russia's Primer" tells** startling things about America. The evils of electrical propaganda here are dragged to light in a schoolbook devoted to electrical propaganda for the Soviet government—*p. 702.*

Last about drought not yet heard

—**Still one hears of drought.** In Michigan hydro production was off 25 per cent for first half of year. In Georgia Plant Atkinson (steam) goes into full operation to relieve hydro plants affected by low water—*pp. 675 and 678.*

—**Novel electrical arrangement** by which dynamic control in crane and hoist lowering operations is obtained through using a motor-generator set as an exciter for a main alternating-current motor—*p. 692.*

Wisconsin commission law hits snag

—**Wisconsin's plan invalid, says** court, because Legislature made Public Service Commission the judge of "public interest" by vesting in it the option to charge to utility under investigation all, part or none of the expense incurred—*p. 675.*

—**New York commission delays** sanction of interconnection between Niagara-Hudson and New York Edison systems at request of Power Authority, which fears interference with plans to bring St. Lawrence power to the metropolis from Massena—*p. 674.*

Good rural lines at smaller cost

State Rights Conflict Is Brewing Over St. Lawrence Development

POLITICAL portents point to the growth of a controversy over the proposed development of the St. Lawrence River that will attract a degree of attention in Congress and the press comparable to that aroused by either Muscle Shoals or Boulder Dam, with New York State taking a vociferous part bearing some analogy to the attitude of Arizona over the Colorado River. New York will, however, have two advantages over Arizona—one in her far greater wealth, population and political prominence and the other in the fact that while the Colorado and its tributaries flow through seven states, the entire American shore of the St. Lawrence is part of the domain of the Empire State.

Coming friction is foreshadowed in a letter addressed to President Hoover on October 3 by Frank P. Walsh, chairman of the New York Power Authority, following the announcement from Washington reported last week that diplomatic negotations between Canada and the United States over the St. Lawrence question were to be at once initiated. The gravamen of Mr. Walsh's letter, to which the President had not replied up to Thursday of this week, is contained in the following excerpt:

It is the unanimous view of the trustees that, considering the vast property right which New York has in the natural resources involved and the great social and economic interest of the people of the state in their development, it is of prime importance that a full accord and understanding be reached through conference between the United States government and the State of New York as an essential basis precedent to negotiations with the government of Canada.

Pointing out that recognition of the rights of the states in the development of water-power resources has been the policy of the United States government for more than a quarter of a century, and alluding to the numerous reports from Washington to the effect that informal negotiations with Canada have already begun and to the ascription to high official sources of authority for these reports, Mr. Walsh concluded:

We further respectfully insist that in international matters affecting the joint rights and interests of the United States government and one or more of its sovereign states an understanding should be reached between the federal and state governments as a condition precedent to entering upon negotiations with a foreign nation.

Governor Roosevelt of New York, who was reported to be aggrieved because no direct reply was received by him from the President when the Governor addressed him on August 11 asking about the status of the St. Lawrence project, is understood to stand behind Mr. Walsh's letter of October 3.

▼

Canadians Argue St. Lawrence Scheme

RECENTLY ANNOUNCED willingness of the Canadian government to conduct preliminary negotiations with Washington looking to an international agreement for the development of the St. Lawrence River has aroused intense interest throughout eastern Canada, and the matter is being widely discussed in the press and in business and political circles. The announcement is received favorably in some quarters, but in others is met with the argument that Canada is in no position at present to assume the heavy financial responsibility which the project involves.

Several factors in the situation are received with enthusiasm, one being a report that the United States is prepared to credit Canada with all the expenditures made by the Dominion on sections of the international waterway between the head of the lakes and Montreal, including the $120,000,000 which will be the minimum total cost of the new Welland Ship Canal. It is pointed out, however, that while such an agreement would remove, so far as Canada is concerned, the specter of the project's huge cost, it would at the same time raise the question of the preservation by Canada of its control over its share of the project.

Another problem from a Canadian point of view will be the preservation of the respective rights of Ontario and Quebec and the securing of the assent of the two provinces to the plans now proposed. Immediately following the announcement by Premier Bennett that negotiations were to be entered into with the United States, Premier Taschereau of Quebec stated his firm opposition to the scheme. On the other hand, Premier Henry of Ontario expressed pleasure at the announcement, though there is yet to be determined the extent to which Ontario is prepared to absorb the hydro-electric energy that would be developed incidental to the navigation works. So sanguine are some in Canada who had much to do with the renewal of negotiations that they believe a treaty will be drafted, agreed upon and submitted to the Canadian Parliament at the next session, the aim being to make an early start on the work for the relief of unemployment.

Vitality of Edison Amazes Doctors

With what his physicians declared to be an "amazing" exhibition of strength, Thomas A. Edison was still fighting with death as the last form of the ELECTRICAL WORLD was closed late Thursday afternoon. During the week he roused at intervals from the stupor into which he had sunk, but recognized no one save apparently his wife. A few spoonfuls of stewed pear was his only nourishment. His doctors, while asserting the impossibility of any rally and daily expecting coma to ensue, refrained from definite prediction concerning how much longer he might live.

▼

Permit for Poughkeepsie-Yonkers Line Withheld

UPON REQUEST of the New York Power Authority the Public Service Commission of that state has agreed to hold in abeyance the application of the New York Power & Light Company for a permit to build a high-tension transmission line from Pleasant Valley, near Poughkeepsie, to Dunwoodie, near Yonkers. This line was to tie in with the New York Edison system, permitting that system and the Niagara-Hudson power group, to which the New York Power & Light belongs, to exchange energy. It involved the building of a very large substation by the New York Power & Light.

The Power Authority opposed approval of the transmission line on the ground that it would be in direct conflict with the policy of the state, since a transmission line located approximately where the projected line was to run will be required in connection with the utilization of the St. Lawrence power. Moreover, it was pointed out, the Power Authority is conferring with public utilities, of which the Niagara-Hudson is the most favorably located, for a contract for disposal of the power.

Chairman Maltbie of the Public Service Commission, in informing Chairman Walsh of the Power Authority of his willingness to postpone approval of the Poughkeepsie-Yonkers line, expressed the opinion that such a line could not interfere with any future super-high-voltage transmission of St. Lawrence hydro energy from Massena to New York City. He said he would call a conference of the companies involved, the commission and the Power Authority to determine this point.

New Wisconsin Utility Act Unconstitutional

DECISION TO THE EFFECT that the provision of the act passed at this year's session of the Wisconsin Legislature which permitted the Public Service Commission of that state to decide to what extent a public utility should be assessed for the costs of an investigation is unconstitutional was made last week by the Dane County Circuit Court. An order by the commission made in compliance with this act was summarized in the ELECTRICAL WORLD for September 26 (page 531).

The court overruled a demurrer of the defendant in a complaint filed by the Wisconsin Telephone Company against the commission resulting from the rendering of a bill by the commission to the telephone company for expenses of an investigation of rates. The court decision said that a provision merely enacting that expenses of investigation should be borne by the utility investigated would have been invulnerable, but that when the Legislature stopped short of this and decreed that the commission could relieve a utility from all or part of such expense when it found so doing to be in the public interest it conferred a legislative function upon a fact-finding body in disregard of the constitution. The commission will appeal to the Supreme Court of Wisconsin.

▼

ERECTING OUTDOOR CONDENSER AT LA FRESA, CALIF.

Installation was recently completed by the Southern California Edison Company at a substation near Los Angeles of this 50,000-kva., 13,200-volt hydrogen-cooled condenser.

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Plant Atkinson to Go Into Service, Burning Gas

FOR THE FIRST TIME since a brief period following its dedication a year ago Plant Atkinson, the 75,000-kw. steam plant of the Georgia Power Company, is operating at full capacity. Decision to place the plant in operation was reached because a shortage of rainfall in north Georgia has reduced the volume of water in the reservoirs of the company's six hydro-electric power plants on the Tallulah and Tugalo Rivers. Low water in the Chattahoochee, also, has curtailed production from plants along that river, including the large station above Columbus. All of these stations are now being operated only during the hours of maximum consumption, allowing the supply of water in the reservoirs to be built up.

Plant Atkinson was constructed as a reserve generating plant against just such an emergency and to provide for power in the future industrial development of Atlanta and its environs. The Georgia Power Company has converted the plant's boilers to permit the burning of natural gas as well as pulverized coal, and four mains have been laid along the bottom of the Chattahoochee River to the Atlanta-to-Marietta pipe line of the Atlanta Gas Light Company. Gas will be bought on a "dump load" basis, and the plant may consume between 20,000,000 and 24,000,000 cu.ft. a day.

▼

Architectural Lighting Is Prominent I.E.S. Theme

HIGHLY COMPETENT discussions of special interest to central-station lighting service engineers filled the pre-convention session of the Illuminating Engineering Society at Pittsburgh on Monday of this week. President W. F. Little, in his formal address, suggested that this feature become incorporated as a permanent part of the annual convention business program. Co-operation was in all respects the watchword for progress, several speakers tacitly conceding that future developments in a large measure meant giving the architect and designing decorator what they want rather than what may be available.

The bright hope of optimistic revolutionists for development and general use in home and industry of gaseous-discharge lamps was somewhat rudely shattered by D. R. Grandy of the General Electric Vapor Lamp Company, who pointed out the apparently insuperable difficulties in the production of white light and the greatly reduced over-all efficiencies of such sources compared with their sensational tube efficiencies. He also spoke of the cumbersome requirements in the way of auxiliary equipment.

"It seems," said E. W. Beggs and C. S. Woodside of the Westinghouse Lamp Company in their paper on architectural lighting equipment, presented before the convention proper on Tuesday, "that architectural lighting is the lighting of the future. It cannot come overnight because people's tastes are slow to change, but if they want spaciousness and airiness and if they like an abundance of light as it is given to them by nature, then they will probably want architectural lighting."

A recommended foot-candle basis for all applications which would establish levels of illumination based upon visual laws as dictated by present scientific knowledge, "rather than to be compromising continually with current practice and narrow economies," was advocated by M. Luckiesh and Frank K. Moss of the General Electric Company. The plan presented by them involves ten classes of work for which recommendations of 0.5 foot-candle to 500 foot-candles were made.

"Synthetic lighting" was the name

JOVE'S FREE AND MAN'S TAMED ELECTRICITY CONTEND

—Wide World Photos

High winds and salvos of thunder accompanied an electrical storm which recently raged at Los Angeles, throwing into striking contrast the quiescent lights topping and surrounding the City Hall.

▼ ▼ ▼

given by George E. Shoemaker of the Philadelphia Electric Company to a system of directional beam control based upon the concept that, "while it is proper to study the appearance and efficiency of light-giving devices, in solving any lighting problem the first step is to decide what the lighting should help us see and from what direction the light beams ought to come to be most effective."

Discussions upon the types of ultra-violet sources, including the "glow lamps," a large bank of which hung over the heads of the audiences at this convention; studies of the ultra-violet in daylight and researches into variations of intensities of the visible and of the ultra-violet in sunlight and in skylight aroused much interest, as did discussions of the commercial phases involved.

Other features of interest were a session devoted to aviation lighting in which the illumination problems of airways, airports and airplanes were discussed; a joint meeting with the Artistic Lighting Equipment Association, during which J. H. Blitzer of the organization outlined an approach to the home market, and the reminiscent silver anniversary session, at which L. A. Hawkins of the General Electric Company made startling demonstrations of the progress of the lighting art and of its probable future trend. At this session, held on Wednesday evening, honorary membership was conferred upon Dr. Elihu Thomson and, through Paul Raymond, French Consul at Philadelphia, upon Prof. André Blondel of France.

▼

Standard Gas-Byllesby Transactions Described

MEANS BY WHICH the Standard Gas & Electric Company provided funds to finance its acquisitions of public utility and other subsidiaries, showing heavy discounts on many of the securities sold to provide cash, with interest charges ranging as high as 12 per cent, were detailed by Dr. T. W. Mitchell, economist for the Federal Trade Commission, on October 13, when the commission resumed its inquiry. At the same time, however, that the Standard company was taking substantial discounts on its own securities, it was making substantial profits by sales of securities of subsidiaries acquired, Dr. Mitchell said. The entire period 1920-1928, he added, was characterized by such profitable resales, bringing the company $7,711,701 in profits.

According to Dr. Mitchell, stocks sold at a discount are made to appear to be fully paid and non-assessable under the procedure used in the Standard company's operations. Stocks of the Standard company were sold through H. M. Byllesby & Company, Dr. Mitchell said, and were reported by the latter company to have been sold at par. The Byllesby company, however, took "commissions and brokerage charges" from the reported sale price, these charges reaching as much as $17 a share in the case of one lot of stock having a par of $50 and $16 in the case of another lot of the same par value, as deduced from the economists' testimony.

These "commissions and brokerage charges" were not actually what they were called, Dr. Mitchell asserted, and did not represent a profit of that amount to the Byllesby company. Instead, he said, they actually represented the discount involved in prices below par obtained by the Byllesby company for the stock when it was sold.

On Wednesday it was testified by John B. Mullock, a Federal Trade Commission accountant, that the total write-up in the plant account of the Oklahoma Gas & Electric Company from 1904 to the end of 1928 was about 5.1 per cent of the fixed capital account, including intangibles, most of the increase being a result of a re-appraisal of properties of the company, which is one of the operating subsidiaries of the Byllesby organization.

The hearing was adjourned till Wednesday, October 28.

▼

Utility Mergers Follow Taxation in Florida

ABSORPTION OF SUBSIDIARIES by the Tampa Electric Company has followed the imposition by the Florida Legislature this year of a gross receipt tax of 1½ per cent on electrical energy. To prevent a double impost—first on energy sold to subsidiary companies and then on sale of the same energy to the ultimate consumer—three organizations hitherto held by the Tampa Electric Company as subsidiary utilities have been merged with the parent company, which now supplies their customers in

its own name. The three absorbed companies were the Plant City Public Service Company, the Polk County Public Service Company and the Dade City Utilities Company.

Referring to the gross receipts tax and also to a tax on intangibles and a third requirement in the shape of an annual corporation tax, Peter O. Knight, president of the Tampa Electric Company, said recently: "Had the Plant City Public Service Company, the Polk County Public Service Company and the Dade City Utilities Company continued their business in their names as hitherto, these taxes would have necessitated an increase of rates; and, in order that the rates to the customers of these subsidiary companies should not be increased, their properties and business have been taken over by the Tampa Electric Company."

The Tampa Electric Company is under Stone & Webster management.

▼

International Conference at Pittsburgh on Coal

BECAUSE DEPRESSION in the coal industry is especially acute, more than the ordinary interest will attach to the third international conference on bituminous coal, to be held from November 16 to 21 at the Carnegie Institute of Technology in Pittsburgh. Experts and economists from seventeen foreign countries, it is announced, will participate, and a comprehensive survey, in the hope not so much of pointing a way out for that industry and thus aiding a general business recovery as of furnishing an accurate picture of the coal industry throughout the world as the necessary preliminary to remedying its ills, is promised. One section of the conference will be devoted to the competition as power sources between coal, petroleum, natural gas and water power.

Dr. Thomas S. Baker, president of the Carnegie Institute, is the organizer of the conference, and the advisory board contains such prominent men as Secretary of the Treasury Mellon, John Hays Hammond, James A. Farrell, president United States Steel Corporation; Auguste G. Pratt, president. Babcock & Wilcox Company; H. B. Rust, president Koppers Company, and Walter S. Teagle, president Standard Oil Company of New Jersey, as well as leaders of the electrical industry like Samuel Insull, F. A. Merrick, Gerard Swope, Matthew S. Sloan and Frank B. Jewett.

Nations which will be represented include Germany, France, Great Britain, Italy, Japan, Austria, Czechoslovakia, Belgium, the Netherlands, Sweden, Poland, Roumania, Spain, Switzerland, Russia, South Africa and Canada.

FLOODLIGHTING BUFFALO'S NEW 32-STORY CITY HALL

Buffalo's seven-million-dollar city hall, said to be second in size only to Los Angeles', is floodlighted nightly by an installation of 154 kw., comprising 34 1,000-watt units, 152 500-watt units, 16 300-watt trough-lighting units and 158 250-watt units. Installation was by the Robertson Electric Construction Company of Buffalo.

▼ ▼ ▼

Michigan Water Power Falls Off 25 per Cent

LOW WATER in the rivers of Michigan reduced the production of hydro-electric power in that state during the first half of 1931 nearly 25 per cent below hydro production in the corresponding period in 1930 and 28 per cent below hydro production in the first half of 1929, according to compilations of data from government and utility sources given out by the Utilities Information Bureau at Ann Arbor. The low water has been due to deficiencies in rainfall throughout the state as a whole which have been accumulating since March, 1930.

Under normal stream-flow conditions hydro-electric production should have been much larger this year than in previous years because of the greatly increased generating capacities provided by new water-power developments—notably the Hardy Dam on the Muskegon River, with water-turbine capacities of 40,000 hp., placed in operation last May by the Consumers Power Company, and the Victoria Dam on the Ontonagon River, with capacities of 17,000 hp., placed in operation last November by the Copper District Power Company.

Users of electricity, except possibly those dependent solely upon isolated hydro plants, have not suffered as a result of the hydro shortage because the bulk of the state's supply of electric power comes from steam plants which provide reserves more than ample to make up for any possible failure in water-power production. In normal years steam plants supply upward of three-fourths of the state's power demands. Last year they provided 77 per cent of all electric power produced in the state. During the first half of this year they provided 78 per cent.

Departures from normal in the six major watersheds of the Lower Peninsula during the first six months of 1931 are shown in percentages in the following table:

	Rainfall Off from Average	Power Output Off from Average
Manistee River	25.7	13.2
Au Sable River	10	17.4
Muskegon River	17.6	23.6
Kalamazoo River	14.6	28.2
Grand River	26.7	41.8
Saginaw-Tittabawasee	36.4	48.4

North Ontario 245-Mile Abitibi Line Finished

SUCCESSFUL TESTS at full voltage, to be followed by operation, are reported by the Ontario Hydro-Electric Power Commission as having taken place over the 245-mile Hunta-Copper Cliff transmission line in the Abitibi Canyon district of northwestern Ontario. Of this line Ontario Hydro built 190 miles of 132-kv. double-circuit steel-tower construction, this voltage rather than 220 kv. being selected because the amount of power involved is relatively small. The Ontario Power Service Corporation built the remaining 55 miles, leading from its generating station, only about 100 miles from Hudson Bay tidewater.

By reason of delay in construction of the hydro-electric plant, however, the commission has found it necessary to enter into a supplementary agreement with the Ontario Power Service Corporation to supply, for the time being, to the Sudbury mining district, from the corporation's existing development of the Abitibi Power & Paper Company at Island Falls, the electrical energy that was to have been available from the commission's development. This substitute power, with a first minimum block of 16,000 hp., will be continued in such quantities as the district may require, up to 25,000 hp., until the canyon development is completed about a year from now.

▼

Joerger Hat Creek Dam Injunction Made Permanent

DECISION HAS BEEN GIVEN by the California Supreme Court in favor of Louis P. Joerger, a farmer with land riparian to Hat Creek, Calif., by which a temporary injunction which the Shasta County Superior Court granted on February 6 last restraining the Pacific Gas & Electric Company from diverting water from Hat Creek is made permanent. The company had been using the water in the operation of its Hat Creek power house No. 2, which has been inoperative since the granting of the temporary injunction.

Mr. Joerger has been engaged in litigation with the power company over the diversion of the Hat Creek water for about eight years. The litigation was brought to the attention of the general public nearly a year ago, when he dynamited a small wooden dam on Hat Creek. The power company secured an injunction restraining Mr. Joerger from further molesting the dam and sued him for $9,367 damages. In turn Mr. Joerger applied for the injunction to prohibit the power company from further interference in any way with the Hat Creek waters. That injunction is the one which has just been made permanent. The outcome of the other litigation was the dissolution of the injunction against Mr. Joerger and the rejection of the company's claim for damages. Some time previous to the dynamiting of the dam Mr. Joerger had been awarded $40,000 as settlement of some of his claims for water rights.

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ROBOT DRINKING FOUNTAIN

When one leans over to take a drink from this fountain in a General Electric office building in Schenectady a relay is actuated by photo-electricity and the water flows.

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Cables for 220-Kv. Use Are Declared Feasible

"CABLES FOR 220-KV. SERVICE are entirely feasible," D. M. Simmons, chief consulting engineer of General Cable Corporation, told the power group meeting of the New York Section, American Institute of Electrical Engineers, last week. Mr. Simmons added that commercial production was not seriously contemplated for the present, since no demand for such installations has been evidenced by cable users.

A trial installation has been made, however, in the General Cable Laboratory, and Mr. Simmons reported that tests showed no practical difficulties for such designs. Special attention was necessary to provide terminals which would prevent flashovers, but while cumbersome they were entirely successful. It was further pointed out that to date no failures have been reported on 132-kv. cables, several installations of which have been in service for a number of years, and that the 220-kv. design was equally susceptible of continuous operation.

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New Unit to Be Built at Seal Beach Station

PLANS FOR INSTALLATION of a 37,500-kw. generating unit in the Seal Beach (Calif.) steam-electric plant of the Los Angeles Gas & Electric Corporation have been announced by Addison B. Day, president and general manager of the corporation. The new unit, to be built at a cost of $3,500,000, will bring the capacity of the station to 110,000 kw. Work on the addition will be started about January 1.

Work to be done includes construction of a 117-ft. x 168-ft. addition to the present Seal Beach station building to house the unit, construction of a new transmission line from the station to the corporation's Eastside substation in Los Angeles and the necessary enlargement of this substation. The new unit at Seal Beach will be the third installed since establishment of the station in June, 1925.

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Indiana Commission Bars Citizens' Service Bureau

BY AN ORDER just issued by the Indiana Public Service Commission the Citizens' Service Bureau, Inc., of Indiana has received a distinct rebuff. The bureau ostensibly was organized in order to fight for lower utility rates in all parts of the state. It was seeking to form branches in many Indiana cities with the express intention of exciting utility patrons into actions for reduction of rates. The bureau was organized by Jap Jones of Martinsville, who immediately took an active interest in an electric rate reduction petition at Franklin, with the Public Service Company of Indiana on the defensive.

Mr. Jones was shown to have a contract providing that he should assist in the preparation of the case, employing attorneys, appraisers, auditors and experts, and would be paid by the city on a commission basis amounting to approximately 25 per cent of the amount saved to all the consumers involved for one year as shown by records based on the rates paid during the previous year. Severely stigmatizing this arrangement, the commission refused to countenance Mr. Jones, who did not appear, and informed Franklin citizens that there was no need to promise a contingent fee to any one in order to have a hearing on rates.

Scattered Happenings in the Electrical Sphere

UNITED STATES

Three Michigan Companies Unite

For operating purposes, the Michigan Electric Power Company, the Michigan Gas & Electric Company (Southern Division) and the Michigan Public Service Company, all Insull properties, have been combined into one general organization with headquarters at Lansing. The three companies will, however, retain their identity in so far as corporate organization requirements are concerned. The change involves doing away with the headquarters of the Michigan Public Service Company at Traverse City and of the Michigan Gas & Electric Company (Southern Division) at Three Rivers and the concentration of authority at Lansing.

Baltimore Utilities and Electrification

Consummation, already announced (ELECTRICAL WORLD, October 10, page 631), of a contract to supply all the power for the Pennsylvania Railroad between Havre de Grace, Md., and Washington when that section is electrified probably will increase the income of the Consolidated Gas, Electric Light & Power Company of Baltimore by more than $4,000,000 annually, Herbert A. Wagner, president of the utility company, is quoted as saying. Harold E. West, chairman of the Maryland Public Service Commission, said the contract of the company and its two affiliates probably will be forwarded to the commission for examination, though, because the electrification may extend into the District of Columbia, the project may assume the character of interstate commerce, and for this reason it is undetermined to what extent the Interstate Commerce Commission and not the Maryland commission will have jurisdiction.

Suit Against Chicago Holding Company?

The Public Utilities Commission of the District of Columbia wants the District Commissioners to sue the Central Public Service Corporation of Chicago, charging violation of the La Follette anti-merger act in acquiring ownership of local gas companies.

Tacoma Council Rejects Utility Franchise

Application of the Puget Sound Power & Light Company for a franchise for the sale of power in Tacoma, Wash., as submitted by the company, has been rejected by the City Council, but the Council expressed its readiness to discuss the form of a new franchise.

South Carolina Tax Petition

Petitions from the South Carolina Power Company, the Lexington Water Power Company and the Broad River Power Company for leave to appeal to the United States Supreme Court for an interlocutory injunction to restrain the State Tax Commission from collecting the impost on electric power generated and sold in South Carolina have been granted by the District Court in Charleston.

Steam Heating by Philadelphia Electric

Controlling interest in the Philadelphia Steam Company has been acquired by the Philadelphia Electric Company, which will spend $4,000,000 on mains and structures necessary to do a central-station heating business in the city, work to begin at once.

Valuation for Missouri P. S. Company

A full valuation and audit of the Missouri Public Service Company, furnishing electric service in approximately 70 towns and communities in western Missouri, has been ordered by the State Public Service Commission.

Demands Inquiry Into Boston Rates

Former Senator Joseph J. Mulhern of Dorchester, Mass., has asked Governor Ely of that state to send a message to the Legislature, which is now in special session, requesting it to investigate the Edison Electric Illuminating Company of Boston, the New England Telephone & Telegraph Company and the Boston Consolidated Gas Company. Mr. Mulhern terms the gross receipts of these utilities "amazing" and says the Department of Public Utilities has shown itself "totally unable to deal with the situation."

Grand Valley (Colo.) Power Project

The United States Reclamation Bureau will open bids at Denver on October 20 for the erection of a power plant on the Grand Valley project near Palisade, in that state. The work, to cost $225,000, will be financed by the Public Service Company of Colorado, which will dispose of the power for 25 years, the plant then reverting to the government.

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Coming Meetings

National Association of Railroad and Utilities Commissioners — Jefferson Hotel, Richmond, Va., Oct. 20-23. J. B. Walker, 270 Madison Ave., New York.

Wisconsin Utilities Association—Commercial Section, Oct. 22-23, Hotel Loraine, Madison; Electric Section, Hotel Pfister, Milwaukee, Nov. 12-13. J. N. Cadby, 135 W. Wells St., Milwaukee.

American Institute of Electrical Engineers—District meeting, Kansas City, Mo., Oct. 22-24. F. L. Hutchinson, 33 W. 39th St., New York.

International Association of Municipal Electricians—Jacksonville, Fla., Oct. 27-30. W. H. Harth, Columbia, S. C.

National Electrical Wholesalers' Association—Starrett's Netherland Plaza, Cincinnati, Nov. 9-13. E. Donald Tolles, 165 Broadway, New York.

North Central Electric Association—Accounting Section, St. Paul Hotel, St. Paul, Nov. 13 and 14. J. W. Lapham, 803 Plymouth Bldg., Minneapolis.

International Conference on Bituminous Coal—Pittsburgh, Nov. 16-21. T. R. Alexander, Carnegie Institute of Technology, Pittsburgh.

Birmingham Rates Are Attacked

Application has been made to the Alabama Public Service Commission for a reduction in the rates of the Birmingham Electric Company on the plea that in the two years since the present rates were fixed wages have been lowered and commodities have materially decreased in cost.

More Energy for East Texas Oil Field

Interconnection of the Southwestern Gas & Electric Company with the Arkansas Power & Light Company at Minden, La., whence a 20-mile, 110-kv. line will be built to Shreveport, is planned to take care in the first instance of the immediate oil-field demand in the east Texas district served by the interconnected subsidiaries of the Central & Southwest Utilities Company, of which the Southwestern Gas & Electric is one. Additional energy to the extent of 12,000 kw. will thus be provided.

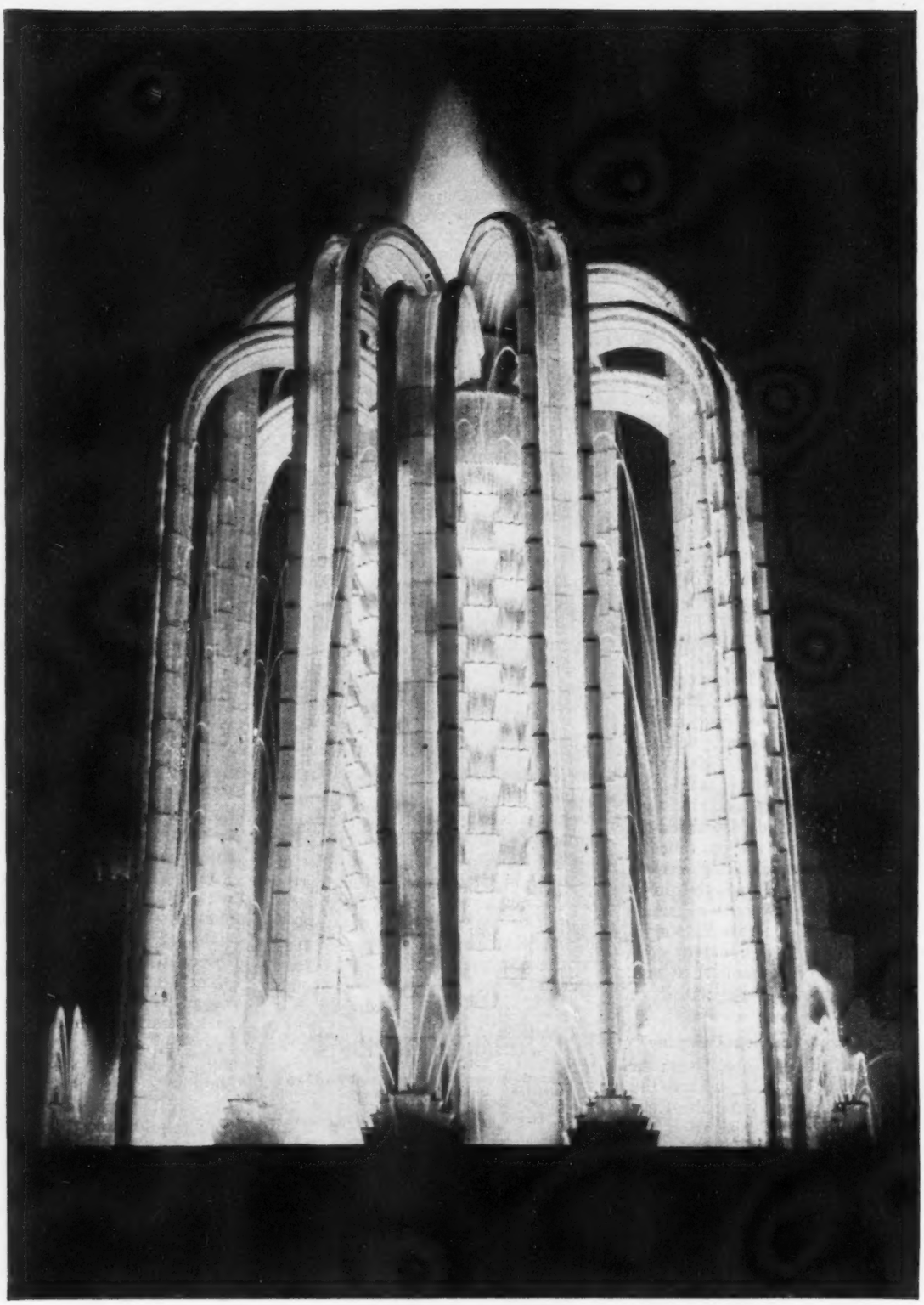
Municipal-Plant Events in Indiana

In Indiana the City Council of Richmond has passed an ordinance appropriating $400,000 for the purchase of a 15,000-kw. turbine and complementary equipment for the municipal electric plant. Total expenditure of more than $850,000 for the doubling of generating capacity is following an effort to have the city obtain standby service from the utility which also serves the city. Mitchell will ask leave to buy its lighting system from the Public Service Company of Indiana. Hearing on a petition of North Manchester for leave to institute condemnation proceedings to take over the Northern Indiana Power Company's property used in serving that city will be held by the commission on October 19. City officials of Blountsville have been enjoined from disposing of the municipal plant at private sale. A vote is to be taken. An injunction is being sought to restrain Wilmington officials from installing a Diesel-engine plant. Edinburg is debating whether to look to the Public Service Company of Indiana or the Fairbanks-Morse Company to meet its municipal-plant load, which has outgrown the present installation.

CANADA

Ontario Hydro Fiercely Assailed

Attacking the Ontario Hydro-Electric Power Commission, Mitchell F. Hepburn, leader of the Liberal party in Ontario, demands an investigation by a royal commission. He says: "The once great enterprise of the late Sir Adam Beck is nothing now but an adjunct of the Tory machine in Ontario, and, if the information we have is correct, a judicial investigation into the Abitibi Canyon deal, the Dominion Power & Transmission deal at Hamilton, and others, will bring to light disclosures that will astound the people."



Paris devises a fountain of light

Skilled artisans wrought imagination-tickling displays for the French Colonial Exhibition. Light, glass, polished metal surfaces and color lent their best under clever co-ordination. Many full-size replicas of famous structures and the products of Colonial France were presented. This interesting electric fountain is based upon a bamboo motif.

EDITORIALS

L.W.W.MORROW
Editor

International Illumination Congress and Commission

NOW that another International Illumination Congress and meeting of the commission have passed into history it is natural to reflect upon its achievements. Such reflection may be made both from an international viewpoint and from a national one. There can be no doubt that international meetings pertaining to peaceful endeavors are worth while if for no other reason than that they conduce to a better understanding between nations and help along the leveling process which must come if we are to have international peace.

From a narrower and more selfish viewpoint we may ask ourselves whether lighting development in the United States profits from international lighting discussions. Owing to our relatively further advancement in lighting other nations are bound to receive more from us than we receive from them. In any group affairs where agreements are necessary the backward to some extent retard the more progressive. Certainly our standards in lighting, low as they are absolutely, are too high for some other countries. Nevertheless, all countries have something to contribute, and we have something to learn from all of them. Of course, gas lighting is of no consequence to us and "daylighting" is of little interest. In some other nations these are important subjects.

Perhaps better progress could be made in these international meetings if the program were radically altered. International discussions might better be confined to important far-reaching subjects rather than have a hundred independent papers presented in parallel meetings. When delegates travel from all parts of the world they should have the best opportunity to discuss subjects and to hear them discussed. It is true that committee reports are presented at the final sessions, but these are hurried as compared to what they might be if the preceding sessions had dealt with these subjects instead of listening to isolated papers, many of which are of inferior quality for international presentation.

If the most is to be gained from the next International Illumination Congress three years hence, something should be done to give the program committee complete authority in planning subjects and in confining the papers to authoritative new work of international scope and quality bearing upon these subjects. Otherwise the meetings will neither yield the best results nor will they continue to receive the support necessary to make them possible or at least worth while.

A code for expansion

THE electrical industry, if it is to continue to grow, is faced with the necessity of finding new markets and of expanding all its existing outlets. Every effort must be made not only to open up outlets for electrical energy that were formerly closed entirely but also all the existing outlets shall have their valves opened wide to permit an unrestricted flow of power. If electrical installations and electrical wiring are to assist in such an objective, they obviously must be stripped of all unnecessary incumbrances and gadgets; they must be simple—and therefore economical—and safe.

Obviously, a wiring or installation code ought to have these principles as the underlying basis of all its requirements. A code so constructed would serve the best interests, not of any particular group, but of all groups in the electrical industry —of the manufacturers, jobbers, contractors, utilities and, most important of all, the general public. Such a code would be a real blessing.

But it should be remembered that even the best code worked out today on these principles may become objectionable and burdensome a year from today. The code, therefore, should be flexible and easily susceptible to change and amendment as technological and industry developments indicate the necessity or desirability for such change.

Perhaps the present situation with respect to the National Electrical Code is the logical result of failure of all the responsible groups in the industry to take as active an interest in the formation of the code as its importance has warranted. Or perhaps they have been lulled into a state of inactivity by the knowledge that the code has no legal status except such as state law or local ordinance may give it. But, if that is the case, they have forgotten the weight of tradition attached to the code.

We need a code—a code that will serve the selfish interest of no person, corporation or association; that will attempt and substantially succeed in the formulation of its rulings for the best interests of the entire industry; that will keep its requirements down to the minimum consistent with safety to property and life, and will permit, therefore, the maximum expansion of the industry and the fullest benefits of electrical expansion to reach the maximum possible numbers, and, finally, one that will march hand in hand with technological progress and will allow easy change and experimentation looking to change when technological progress indicates its desirability or safety. When all the responsible members of the electrical industry realize the importance of such a code and show it by taking an active part in its formulation, we shall get it and keep it adjusted.

Progress of system planning

TO PLAN intelligently the development of an already large electric system into a larger one requires close interweaving of modern ideas with older practices that, although outdated, cannot be discarded. Planning would be a comparatively simple thing if it could be done from the ground up, could be started all new. But it is complicated by the persistence of older things that are yet far from obsolescence and amortization and that must be included in the scheme. This is the reason why the new-born art of power-system planning appears in its examples sometimes as less like planning than like making the best of conditions fixed by previous and less ordered development. Yet the fact that these previously fixed conditions have been examined, investigated and assessed in relation to themselves and to future development is in itself a principal evidence of planning, even though the scheme that may be erected upon them appears to be no more than a natural result of such conditions. It may or may not be possible to change the conditions in any one case, but it is possible in any one case to appraise them and so to control their future effect as eventually to secure a designed result.

Therefore, we say, "Be patient," to those electric utility executives who, under the spell of a new thought, appointed planning engineers in their organizations two or three years ago and have as yet seen no fruition whatever from the planning effort, or at best have seen as its result only an analysis of existing conditions. The industry moves. It is sufficient for some to realize simply that it does move. Others try to find out the direction of movement, and still others attempt to fix both direction and speed of movement.

For many years the responsible men of the electric utility industry were content to be carried along with its development. Perhaps it can be said that they were lucky in the fact that little or no accounting of their responsibility was demanded of them. But it is not sufficient now just to go along with the parade. Every responsible executive should know the direction his particular unit of the industry is going and, after he has learned that, he should change the direction if it is wrong.

Four years or so after its recognition as a definite function in electric utility development the art of system planning is beginning to show results in the power companies in which it has been adopted. That the results in many cases appear to be only an appraisal of existing conditions is no least evidence that the effort is unproductive. As a matter of fact it is the best evidence that the effort is productive. The future is the consequence of the present. If one would shape the future, he must assess the present in the light of

as complete and comprehensive a knowledge of it as he can obtain. To collect, co-ordinate and analyze the data composing that knowledge is the first and most important thing in system planning. And that task is being done.

Rural electrification and present commodity markets

IN SERVING the average rural area the problem has always been and always will be how to find enough outlets for sales of electrical energy at a price that will make such sales possible and yet pay the cost of carrying the investment in the distribution extensions necessary. This has been no mean difficulty. If one considers a typical load density of four farms to the mile, it is obvious that with a cost of extension, including primary, transformer, secondary and meter installation, of say $2,000 a mile (not an unusual figure two or three years ago), the required revenue becomes so high as to render the whole scheme almost impossible from an economic standpoint. The result has been that many utilities have given up trying to solve the rural line problem.

But not all. Some have stuck to it and have brought about amazing reductions in cost. By simplification of design, by taking advantage of the strength in materials entering into the supports and conductors, by eliminating all unnecessary supervision, many companies have succeeded in building rural lines complete for from $1,000 to $1,200 a mile. In other words, costs have been cut almost in two and in many cases further than that. This, it is obvious, has completely changed the economic picture of rural electrification. The prevailing low costs of materials have also played their part.

With many prices of material entering into rural construction at almost unbelievably low figures, and with almost 90 per cent of the farms in the United States (that is, more than five million) still unelectrified, there is now presented to the electrical utilities the opportunity to meet successfully a long and vexing problem, and, incidentally, the opportunity to connect to the lines as customers and friends a group of the population among the most reliable and stable.

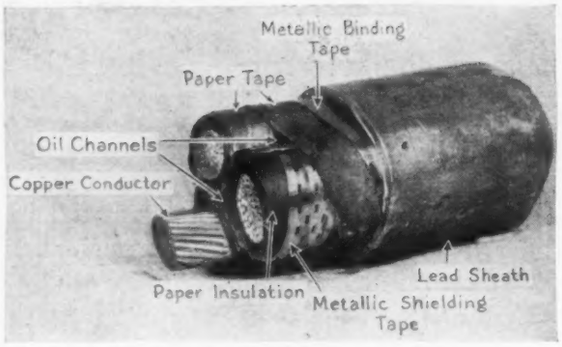
Changing character of the electrical contractor

FRESH emphasis upon the sweeping change that is coming over the thinking of the electrical contractor was given at the convention of the Association of Electragists International last week. For years the contractor was a mechanically minded man. He grew up during a period of expanding markets. His function seemed to be only to supply the steadily increasing demand for electric wiring in buildings of every character. His concern was to keep pace with the evolution of the materials and technique of his craft. He was not a salesman or a developer of markets.

Then times changed. Just as the power company has had to learn to sell, to build markets, to create demand, so the contractor is now reacting to the same problem in the same way. Last week's meeting in Hot Springs, Ark., gave a good reflection of it. Interest centered on sales. The necessity and opportunity for the contractor to specialize in his work and establish himself in a preferred position in his selected specialty ran through the program and the discussion. And this means selling, commercial thinking, market-mindedness. It means that the electrical contractor is coming into a new phase in which he will enjoy a larger prosperity because he will be a better business man. It means also that he will exert a larger influence in the policies of the industry that affect the marketplace.

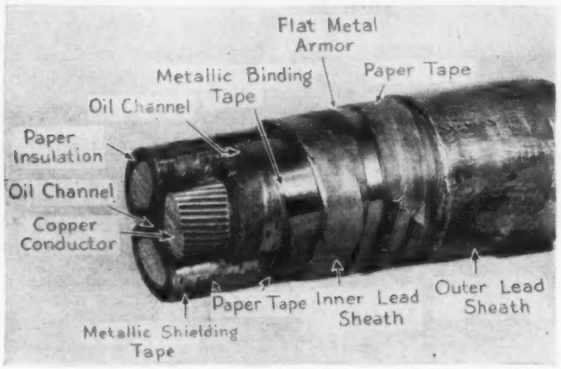
It is because of this that the Electragists' association has been increasingly concerned over the improvement of competitive conditions in the local merchandising of domestic appliances. Its committee on trade policy again brought in a report pointing out the basis of complaints from dealers that have been made against the power companies and recommending the policies that would satisfy the situation. Progress has been made, however, and a better understanding exists between the Electragists and public utility companies today than a few years back. The presence of the president of the National Electric Light Association at this convention for two full days was a fine expression of interest and good will. And this is well, for the changing character of the business of the contractor is going to throw these two groups into a closer relationship.

Installing a 33-Kv., Oil-Filled Cable



Single sheath for normal runs

The conductors of the cable are of semi-sector construction, insulated with 225 mils of wood pulp paper insulation. Each conductor is wrapped with a 4-mil perforated copper shielding tape interlocked with one paper tape and the conductors are bound together with a 4-mil steel binding tape, which is also interlocked with one paper tape. A nine-sixty-fourths 2 per cent tin alloyed lead sheath is applied over all.

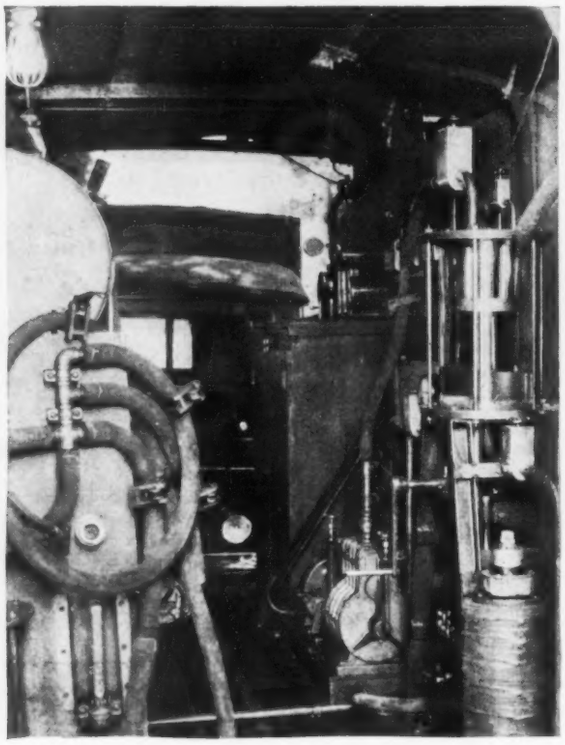


Double sheath for steep grades

The assembly of the three conductors is covered with a 100-mil pure lead sheath; two layers of ¼-in.x13-mil copper tape (applied with a ¼-in. opening) and interlocked with paper tape. A second 100-mil pure lead sheath forms the outer covering.

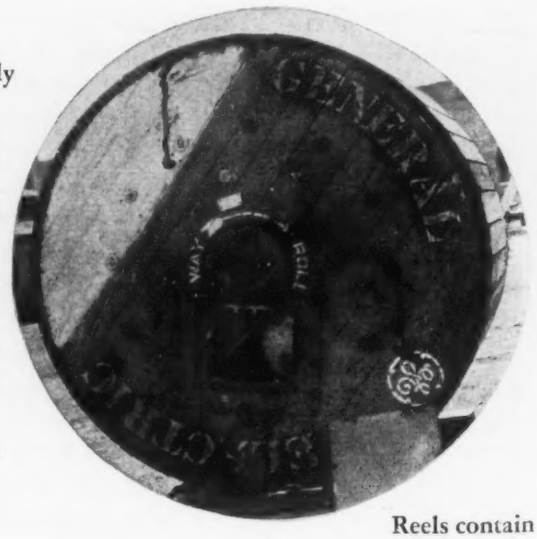
OIL-FILLED cables for medium transmission voltages are growing in favor, particularly for important intra-system connections. Three miles of such type "H" cable have been put into service by the Public Service Company of Northern Illinois in the past year. The latest installation, which furnishes the interesting series of pictures here reproduced, is three-quarters of a mile long and consists of three 500,000-circ.mill conductors rated at approximately 18,000 kva. at 33 kv. The cable differs slightly from the usual type "H" in that the oil channels of BX tubing in the filler spaces are dispensed with.

The permanent oil supply system consists of a number of pressure reservoirs installed in the manholes along the route of the cable. The reservoirs consist of flexible, flat gas-filled cells contained in a steel tank, the oil being outside of the cells and the pressure being maintained



Portable assembly of equipment

All of the special equipment required for the installation, oil degasifier, filter press, vacuum pumps, impregnation bottles, oil storage tanks, etc., were mounted for convenience on a truck trailer, which was moved from manhole to manhole as the work progressed.



Reels contain oil reservoirs

The cable was shipped filled with degasified oil under positive pressure maintained by small reservoirs mounted in the drums of the reels. During installation the oil pressure was maintained on the cable by means of the reel reservoir until all but part of the last turn on the reel had been pulled into the duct, at which time a portable reservoir was connected to the cable and the pulling operation completed.

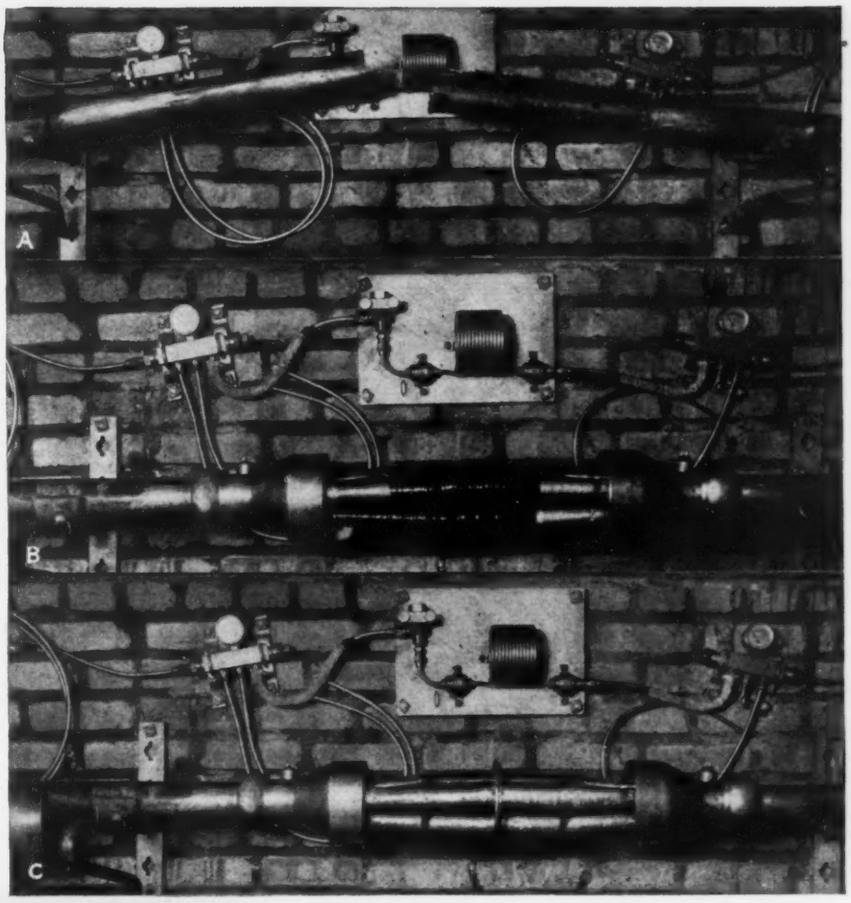
Making a joint

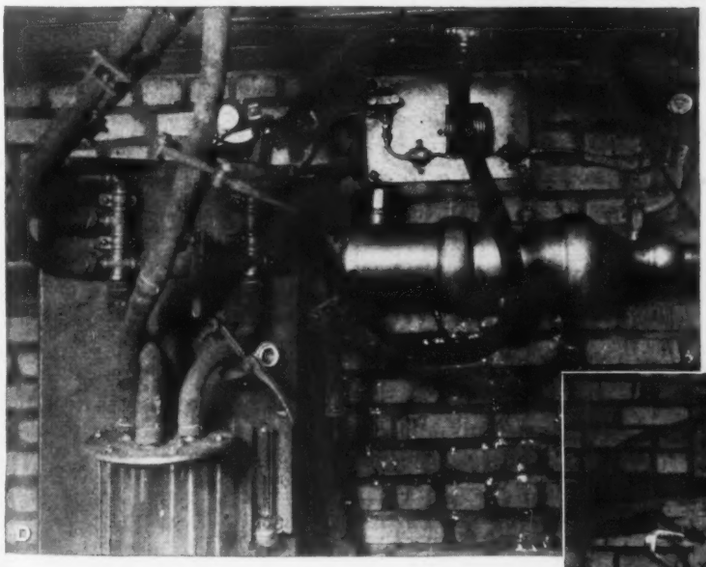
The normal joints are of the semi-stop type, having cork gaskets to prevent the flow of oil from the cable. The first step in making the joints, after the cables are properly trained and portable reservoirs are connected to the opposite ends of both of the lengths to be spliced, is to bend the ends of the cable upward to an angle of approximately 45 deg. to form an oil trap, so that with a small oil flow air cannot enter the cable.

The reservoirs on the opposite ends of the lengths of cable being spliced are adjusted to exert only a small pressure and the cables are cut. The end sections of the joint casing are now wiped to the cable sheaths, the cork-sealing gaskets installed and compressed, the portable reservoirs adjusted to increase the oil flow and the cable ends bent downward to their normal position. The connectors are then sweated, the insulation stepped, low-loss varnished-cambric tape applied, after which copper braid is applied over all to complete the shielding of the individual conductors.

The cable, except for that portion of the conductors on the joint side of the cork-sealing gaskets, is kept under positive oil pressure at all times during the joint construction. After the joint casing has been wiped in place the joint is given a one-hour vacuum treatment and filled with degasified oil.

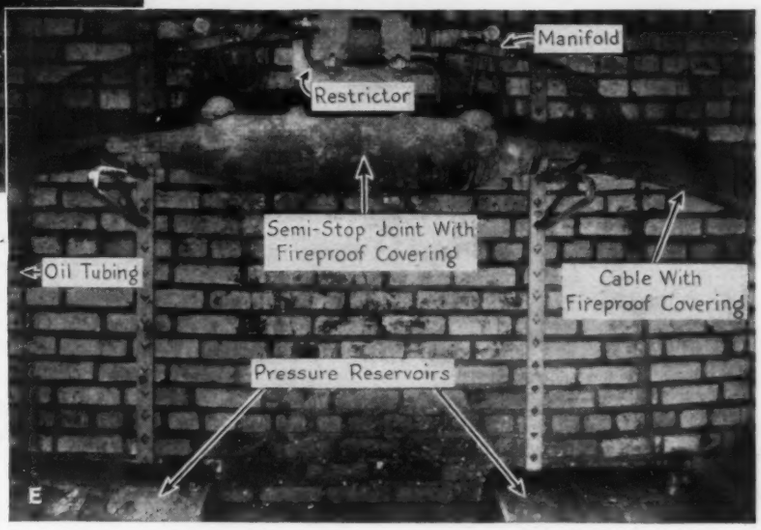
(A) The cable is cut.
(B) Insulation applied and shielding started.
(C) Shielding completed and spacer installed.
(D) Vacuum treatment.
(E) The job is finished.

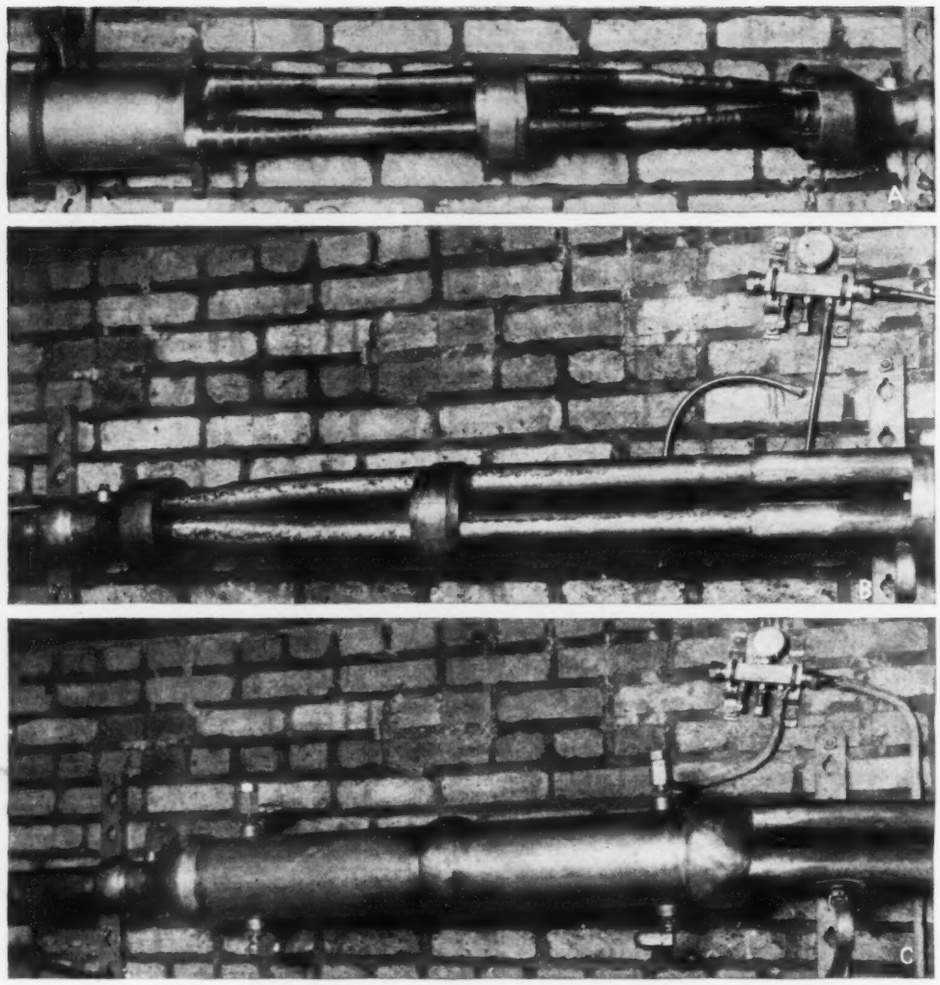




In case of a failure in one section of cable the characteristics of the restrictors are such that the adjacent sections will remain under a positive oil pressure from two to three hours, thereby allowing sufficient time for the isolation of the defective section of cable and for closing the necessary valves to prevent a complete drainage of oil in the cable sections adjacent to the failure.

The joints used for connecting normal and reinforced sheath cable at the bottoms of the hills by the compressed gas in them. The individual tanks range from three to ten gallons active oil capacity, the size depending on the length of cable to be fed and the contour of the cable. The individual reservoirs are connected to the joints on the cable side of the cork-sealing gaskets and the cork-sealing gaskets of the joints are by-passed through a restrictor so that all of the reservoirs attached to the cable operate in parallel.





Trifurcated terminals

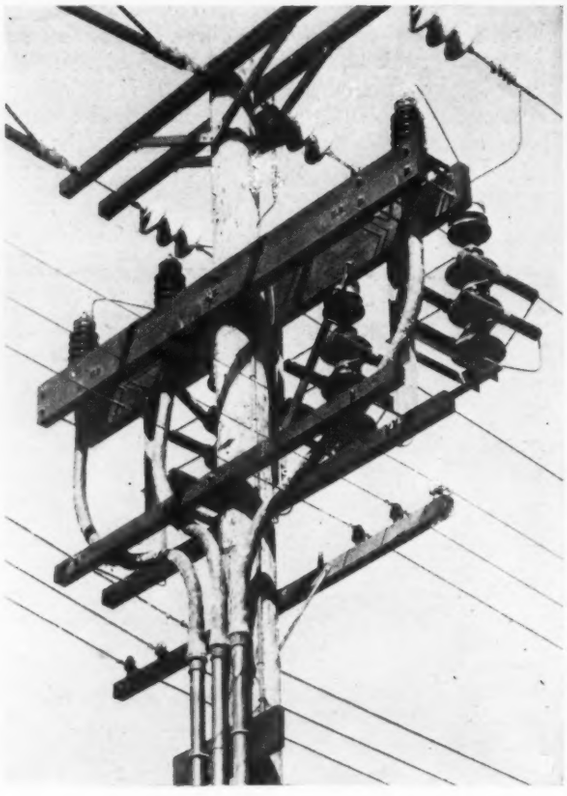
Single-conductor, oil-filled terminals are used and connections made to the three-conductor cable by means of 750,000-circ.mil, 1/C, 22-kv. solid, paper-insulated cables having 26/64-in. wood pulp paper insulation and an 8/64-in. lead sheath. The connections from the oil-filled, three-conductor cable to the single-conductor, solid cable was made by means of a trifurcating positive stop joint which is similar to the straight positive stop joints, except that three single-conductor cables enter one end of the joint instead of the one three-conductor cable.

(A) Positive trifurcating stop joint in place.

(B) Insulation and shielding braid applied.

(C) Finished except for two oil connections.

(D) Cable pole with protective equipment.



are of the positive stop type, in order to prevent the sheath of the normal cable from being subjected to the pressure of the static head of oil in the cable on the hill. This joint is very similar to the semi-stop type used on the level, except that a core and spacer unit, consisting of a brass casting into which three separately insulated conductors have been pressed and shrunk, is installed at the center of the joint. The core and spacer unit prevents the oil in one section of the joint from migrating into the other half.

Very careful planning and executing of the installation work was necessary. Each length of cable was tested for gas content before being pulled into the conduit. The joints and oil piping during construction were vacuum treated and filled with a special oil which had been filtered, heated and degasified. As a final check, the complete installation was tested for gas content after all work in connection with the installation of the cable joints and terminals was completed.

Turning Cable Reels

By H. G. BERKEY

Missouri Public Service Commission, Jefferson City, Mo.

Quite often one sees from four to six men working with bars to turn a reel of cable so it will roll in the desired direction. All the gang necessary to handle reels of cable is the number required to roll the reels in a straight line. Turning the reel is quite a simple matter. If on a floor, the only tool required is a short piece of pipe whose length is slightly more than the radius of the reel. Place the end of the pipe under the head of a through-bolt in the center of the reel. Let the other end of the pipe touch the floor about 6 in. ahead of the reel so that as the reel rolls forward it will tend to rise on the pipe. The weight of the reel will turn it away from the pipe. If the reel is to be rolled on the ground, lay a short piece of board under the end of the pipe so that it will not be driven into the ground.

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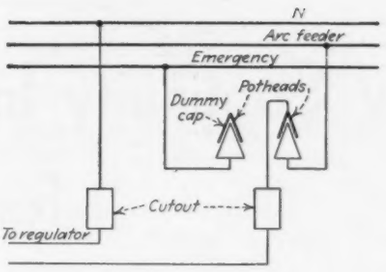
Distribution Circuit Also Street-Lighting Feeder

Making the best use of existing facilities, rather than rushing into the installation of new ones, has permitted the Indianapolis Power & Light Company to make substantial savings in the rearrangement of service to about 800 kw. of street lighting, according to P. W. Ross, street-lighting engineer of the company. The course taken saved the investment of several thousand dollars in primary switches and time clocks or in the installation of pilot wires and remote-control apparatus.

Recently it was found desirable to eliminate from the system one of the main substations from which 32 25-kw. street-lighting circuits were feeding through sixteen 50-kw. station type two-circuit constant-current regulators which were manually controlled. Inasmuch as these regulators were obsolete and had served their useful life it was decided to change over to 15-kw. pole type regulators, which increased the circuits to about 60 and immediately brought up the problem of satisfactory control.

It so happened that a 4,100-volt, three-phase, four-wire distribution circuit of No. 00 copper feeding from the generating station traversed the same territory. There was only a small amount of industrial and residential load on this circuit and at the same time there were duplicate circuits with sufficient available capacity on them to absorb this load. The load was transferred, leaving a three-phase circuit which could be used for street-lighting purposes only the 60 regulators being spread over the three phases, using either the feeder neutral or the neutral of any adjoining circuit. The primary feeder could be controlled at the plant through an oil switch.

In order to prevent a complete outage in case of failure a spare switch was installed. To prevent excessive outage in case of the failure of one or more phases of the primary circuit the pole type regulators were so located as to be on poles on which at least one phase of some other circuit was operating. Then by means of the arrangement of disconnecting potheads shown in the



Street lights get energy if regular feeder fails

sketch it became an easy matter if the regular street-lighting primary circuit were dead to have a trouble man disconnect the pothead on it and connect to the phase of the emergency circuit, which would carry the load until repairs could be made on the street-lighting feeder.

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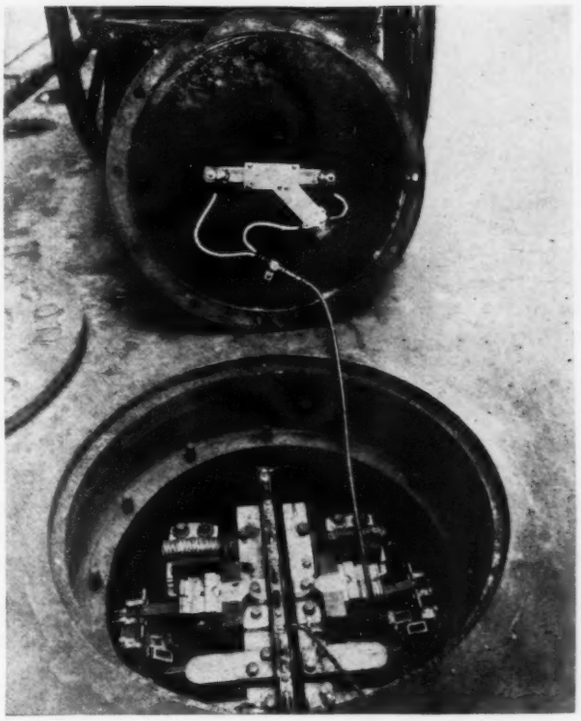
Space Heater Protects Apparatus Automatically



This small 220-watt electric space heater, attached to the cover in a typical manhole breaker installation, is automatically controlled and protected by a built-in thermostat. The temperature maintained is 100 deg. F., and as at this heat moisture has little tendency to condense, and in consequence to drip down on apparatus and cause service difficulties, performance is greatly improved.

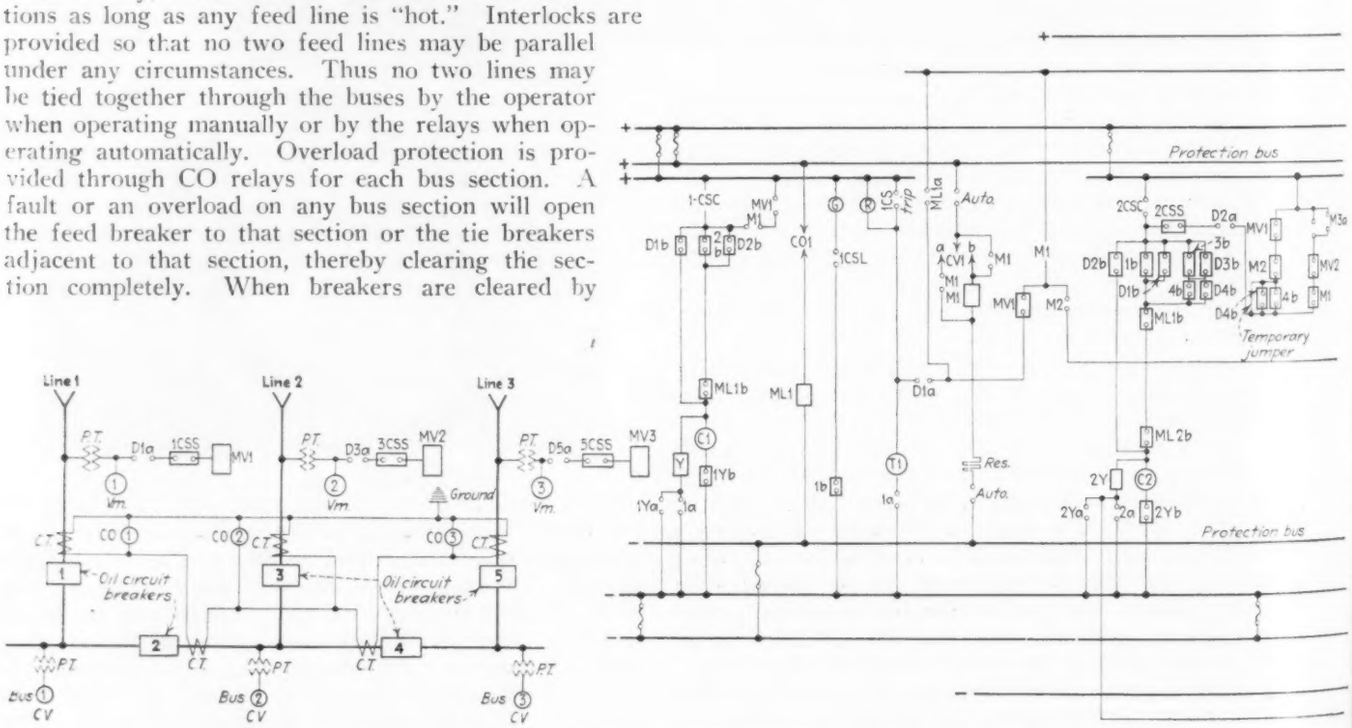
The thermostat is said to have virtually indefinite contact life. It is of the quick-make-and-break type and does not cause radio interference. In addition to limiting the temperature of the cover, the thermostat protects the space heater against overheating. The thermostat is applicable for voltages of 110 and 220 alternating current and 115 direct current.

Supply Continuity Insured for House Service Buses

TO GUARD against interruptions of energy supply to the house service buses at the new James H. Reed station of the Duquesne Light Company the power-station engineers and the staff of the Byllesby Engineering & Management Corporation, designers and constructors of this Pittsburgh power house, devised an ingenious "voltage-chasing" scheme. The plan applies to the turbine room, boiler room and lighting banks and includes 2,300-volt and 440-volt services. In the accompanying figure, illustrative of the principle, the arrangements for voltage chasing for two tie-line breakers and three lines are shown. Assuming various openings and closures of breakers 1, 3 and 5 on the lines and 2 and 4 on the ties, there are eight possible combinations under which power may be drawn from buses 1, 2 or 3. The operation and relaying of the 2,300-volt and 440-volt schemes are identical.

The schemes, as shown, are set up for three feed lines, three buses and two tie breakers each and are designed to be operated either manually from a control switch or automatically from relays. When operated automatically, service is self-maintained on all bus sections as long as any feed line is "hot." Interlocks are provided so that no two feed lines may be parallel under any circumstances. Thus no two lines may be tied together through the buses by the operator when operating manually or by the relays when operating automatically. Overload protection is provided through CO relays for each bus section. A fault or an overload on any bus section will open the feed breaker to that section or the tie breakers adjacent to that section, thereby clearing the section completely. When breakers are cleared by the over-current inverse-time-delay relays, those breakers cannot be reclosed, either by manual or automatic control, until the operator has reset the lockout relay by hand, which he will not ordinarily do until after an investigation of the nature of the trouble. This lockout relay also prevents the closing of any other breaker on the faulty bus section. A bell alarm is provided, which will operate whenever any breaker is tripped, either through the overload relays or upon automatic transfer on voltage failure. This will allow the operator to check his layout to insure that all motors are still operating properly. The bell does not operate when breakers are tripped by the operator.

Wiring is so arranged that any breaker may be taken out of service for test or maintenance without interfering with the operation of any other breaker in the scheme. This is accomplished by pulling the disconnecting switches. When "disconnects" are open on any breaker, the scheme functions as though that breaker were open, regardless of the actual position of the



Voltage-chasing scheme involves automatic selection of power sources

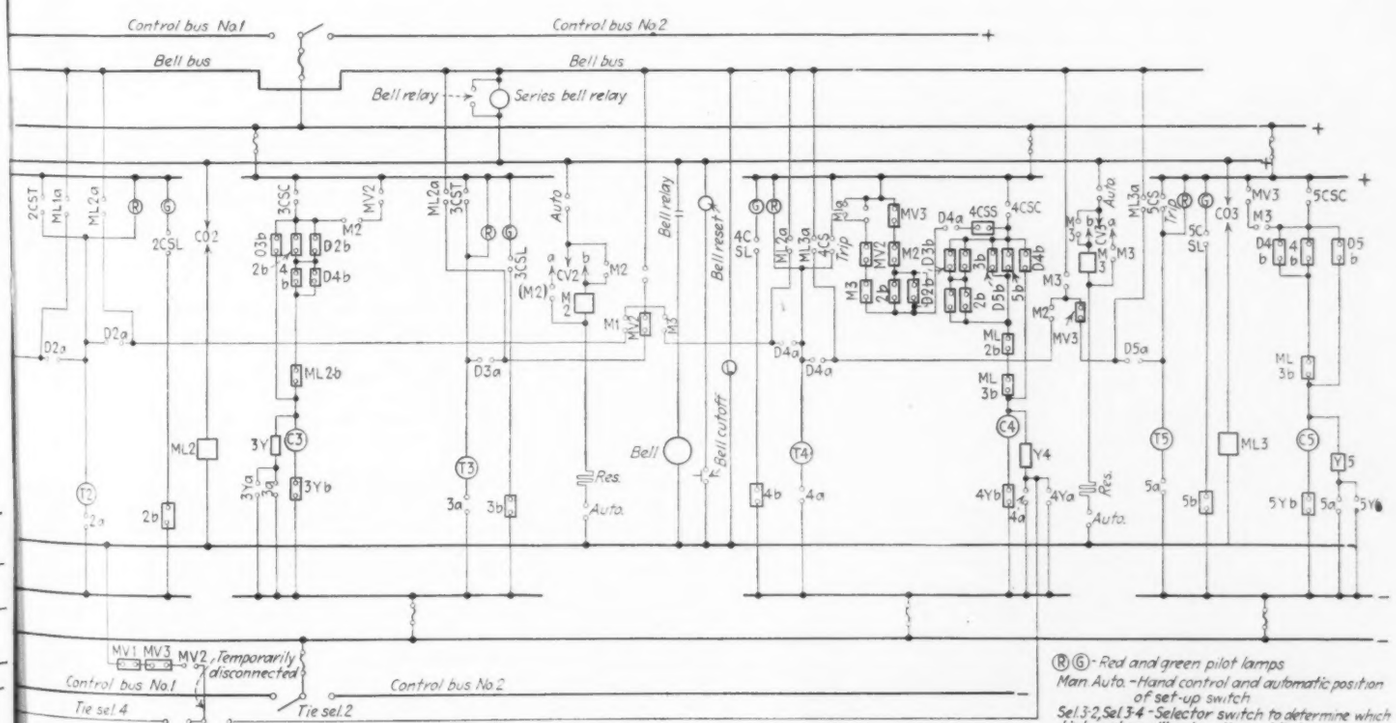
breaker. Moreover, the breaker is completely removed from the scheme, so that it may be operated only from its control switch and by no other source.

While the scheme will not permit the paralleling of any two feed lines, at present it will allow all three bus sections to be picked up from any line in the group. Arrangements are made, however, so that in the future, if desired, only two sections may be picked up from any one feed line. This may be accomplished by removing two temporary jumpers on tie-breaker auxiliary switches and by connecting one jumper to a selector jack. Any breaker may be tripped at any time, regardless of manual or automatic control, by the operator, from the control switch. The overload relay will also trip the proper breaker upon occurrence of overload. Any breaker tripped from the control switch will remain open under all circumstances until the controller is reset.

No switching is possible whereby any two feed lines may be paralleled. If it is desired to transfer load from one feed line to another through tie breakers, it is necessary to trip the one breaker first and then close the other. This action can be done rapidly without resulting disturbance. To transfer in the minimum amount of time, control switch of the new feed breaker is held in the closed position and the present feed breaker is then tripped. The load is transferred at once without paralleling. Any breaker may be tripped from the control switch at any time. The overload relays will also trip the proper breakers upon overload or short circuit.

After service has been established by manual control, automatic changeover on voltage failure may be secured, and service maintained, as long as there is a "hot" feed line. To effect this automatic set-up all "automatic jacks" are turned to the "auto" position and the control handles of all control switches on open breakers are turned to the closing or "red" position. Any breaker that does not have its "red" target showing on its control switch is locked out and will not close automatically unless it is turned to "red" position. For the same reason, if any breaker is tripped by the operator at any time from the control switch, it is locked out and will not close again until the control switch is reset to the close or "red" position.

When operating automatically, it will be observed at various times during changing over that some of the "red" or closed position pilot lights are lighted when their respective breakers actually are open. Thus both the red and the green lights of the same breaker may burn at the same time. This feature is due to the fact that some CV and MV relays have not completed their operation at this time and are tying the trip circuits of closed breakers to those of open breakers. Under normal operation this double-light condition is only transient and disappears as the sequences are completed. However, should this condition prevail continuously on one or more breakers, it indicates that the CV or MV relays are not operating properly, owing to friction, blown fuses or other trouble. In any event, if a double-light condition stays on with any breaker, it is an indication of trouble in the circuits and is a visible clue to the location of such trouble. The green light shows that the breaker in question is actually open.

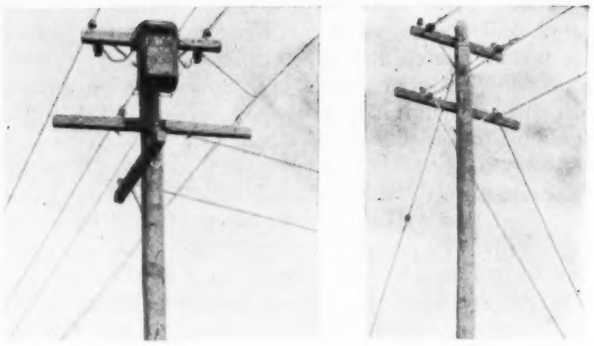


CV1, CV2, CV3 - CV relays with front and rear contacts
MV1, MV2, MV3 - A.C. type MC relays, independent circuits
ML1, ML2, ML3 - ML relays, electrically operated, hand reset
CO1, CO2, CO3 - CO overload relays, single trip circuit
C1, C2, C3, C4, C5 - Closing relays on breakers
T1, T2, T3, T4, T5 - Trip coils on breakers
ICS, 2CS, 3CS, 4CS, 5CS - Control switches for breakers
M1, M2, M3 - MC relays used as aux. relays to CV1, CV2, CV3

C - Closing contact
t - Trip contact
L - Lamp contact
S - Slip contact closes when control switch is turned to close position and opens when control switch is turned to trip position

a | Contact which is made when breaker or disconnect is closed or when relay is energized
b | Contact which is made when breaker or disconnect is opened or when relay is de-energized
1Y, 2Y, 3Y, 4Y, 5Y - MC relays used as cutoff for breakers closing relays

Ⓡ Ⓖ - Red and green pilot lamps
Main Auto. - Hand control and automatic position of set-up switch
Sel 3-2, Sel 3-4 - Selector switch to determine which tie breaker will pick up the middle bus section if No.3 breaker opens
Tie sel.2, Tie sel 4 - Selector switch to determine which end section will feed middle section if No.2 line is only line hot
C.T. - Current transformers
P.T. - Potential transformers
D1, D2, D3, D4, D5 - Auxiliary switches on breakers disconnects



Typical pole tops for rural construction

Rural Lines for $500 per Mile

By M. T. CRAWFORD
General Superintendent
Puget Sound Power & Light Company, Seattle, Wash

IN THE Pacific northwest rural lines have been extended and service is given in practically all of the well-settled territory. Keen interest is now being displayed in developing a type of construction at the lowest practicable cost, in order that newer sections as yet sparsely settled may be given service and their growth encouraged.

The overhead systems committee of the Northwest Electric Light and Power Association surveyed the practice of all member companies in this territory and prepared a review summarizing the data on types of construction and indicating the present general practice. In the past the usual construction has been of standard character with 35-ft. poles, spans averaging 275 ft. and No. 6 bare hard-drawn copper at voltages from 2,300 to 13,000, 6,600 volts predominating. Single-phase lines of this type usually cost in the neighborhood of $600 to $800 per mile, including overhead charges.

A special type of construction was reported by the Portland General Electric Company on its Young Electric Company division, known as the type "X" construction, using two 3x4-in. timbers in an "X" frame attached to concrete bases. The structural cost, exclusive of overhead for superintendence, engineering and stores, was reported to average about $271 per mile.

Feeling that the type "X" construction presented certain inherent disadvantages, particularly the wide space taken up on the highway for the spread of 4 ft. at the base, engineers of the Puget Sound Power & Light Company have endeavored to combine the various economical features possible in pole-line construction and develop a type which would provide the lowest first cost with reasonable provisions for permanency and future growth. The resulting standard of construction has now been in use for some time and actual cost figures show a decided economy. It is used only in the more thinly settled rural area, in which there is no immediate prospect of growth into communities or towns. Lines are built for a single-phase, 6,600-volt primary circuit, but a third wire may be added for three-phase by using a pole-top pin.

The structural costs, exclusive of overhead charges, but including charges for equipment, has been running

Labor-saving machinery reduces rural line costs

Specifications

Poles.—Western red cedar class "C," 35 ft. in length, set 6 ft. in the ground, treated with Anaconda preservative paste at the time the pole is set.

Crossarms.—Standard low-voltage four-pin crossarms are used for the primary circuit and six-pin crossarms for seconday circuits when and where needed.

Insulators.—Porcelain insulators are used for primary circuits and glass insulators for secondary circuits.

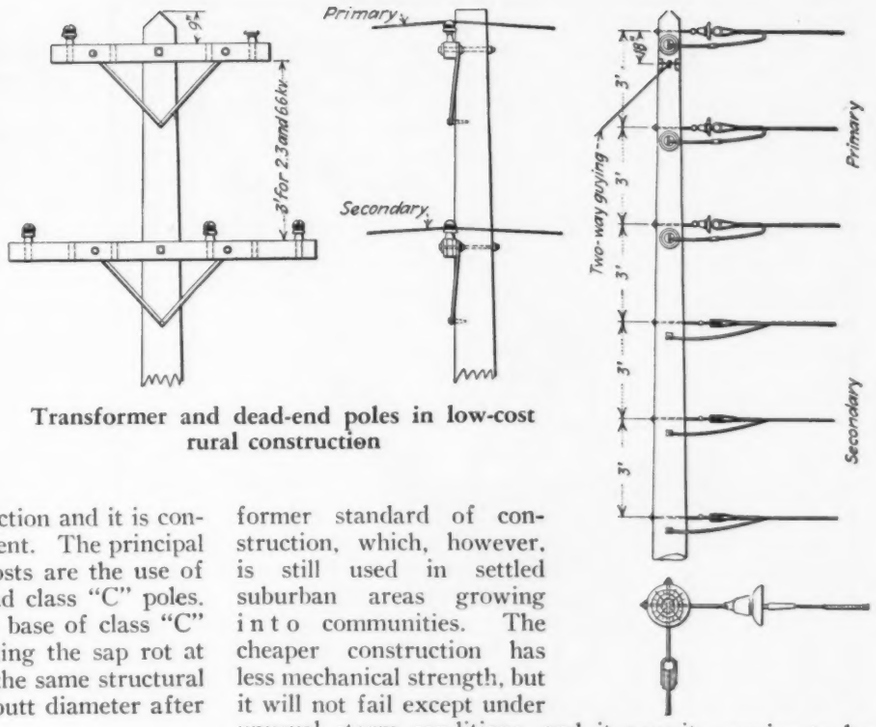
Conductors.—Conductors are strung at sag and tension in accordance with U. S. Bureau of Standards table between medium loading grade "C" and light loading grade "A." No. 4 A.C.S.R. bare wire with conductivity equivalent to No. 6 copper is used for primary circuit and No. 4 H.D. bare copper is used for secondary circuit.

Span Lengths.—The standard span length is 450 ft. on tangents. On curves spans are shortened as necessary by use of vertical arrangement of wires on a slightly taller pole. Corners can be turned with a single strain insulator on each conductor without an excessive reduction in span length. In the usual case the average span is kept close to 400 ft.

Clearances.—The minimum clearance above ground is 18 ft. for secondary and 21 ft. for primary circuits. A separation of 50 in. is provided for primary wires and the two outer wires on secondary circuit with 24 in. neutral where three-wire secondary is run. The primary and secondary circuits are spaced 3 ft. apart.

Construction Methods.—Poles are purchased from farmers and timber men in the vicinity, delivered at the stake. Three men operating a four-wheel-drive truck, equipped with hole-boring and pole-raising machinery, dig all holes and set poles, followed by a light line crew stringing wires. With a large volume of line work crews are dispatched so that a minimum of time is lost in going from one job to another.

slightly less than $300 per mile for pole line and primary circuits only, not including transformers, secondaries, service or meters. On this work linemen at $7.20 per day and labor at $5.40 per day were used. Increasing the cost figures on the Young type "X" construction, where linemen at from $5 to $5.60 per day and labor at $4 per day were used, by applying our wages, the type "X" construction costs would be brought up to approximately $295 per mile, exclusive of royalty charge on the patent.



Transformer and dead-end poles in low-cost rural construction

From the above it appears that a standard pole line of the type described can be built at about the same low cost as the type "X" construction and it is considered by many to be a better investment. The principal features which reduce the pole line costs are the use of labor-saving machinery, long spans and class "C" poles. The application of preservative to the base of class "C" poles is expected to result in eliminating the sap rot at the ground line so that the poles have the same structural strength as class "A" poles of larger butt diameter after the sap rot has taken place.

After adding 15 per cent overhead and a reasonable amount of secondary circuit, transformers and meters the total cost will not much exceed $500 per mile, so that a figure of 10 cents per foot is used in preliminary estimates. This is a substantial reduction from the former standard of construction, which, however, is still used in settled suburban areas growing into communities. The cheaper construction has less mechanical strength, but it will not fail except under unusual storm conditions, and it permits service to be given economically during the development period in sparsely settled areas. Additional poles can be set in the middle of spans and a third wire added economically, if load and service conditions warrant reinforcement at a later date.

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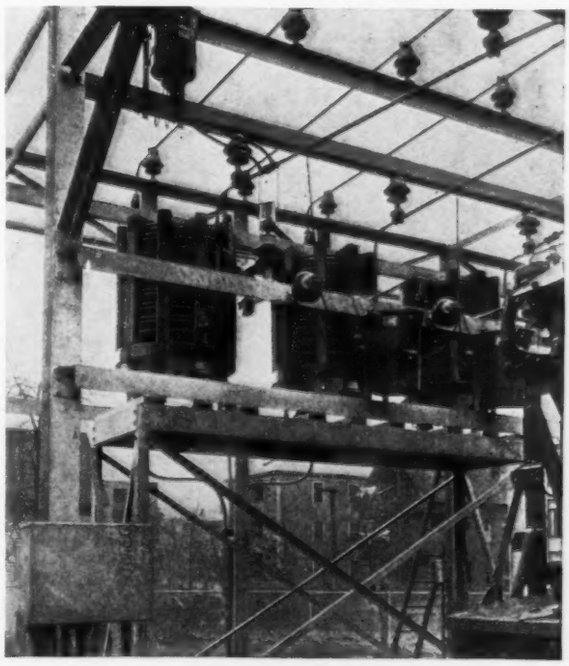
Economical Reactor Mounting

Long taps and protective screening were made unnecessary at the Webster Street station of the Worcester Electric Light Company by mounting feeder reactors about 8 ft. above the ground on a structural-steel platform 11 ft. 4 in. long by 3 ft. wide. First costs were also reduced by mounting the potential transformers on an angle iron attached to the 13-kv. arbor frame and locating current transformers above the reactors on angle-iron supports, with the by-pass protectors directly below the current-transformer taps. Additional bus supports would have been required if a low mounting of reactors had been used, and the yard clearances for the movements of maintainers would have been reduced.

The reactors are 400-amp. General Electric units of the cast-in-concrete type, with 5 per cent reactive drop. The footings of each single-phase reactor are carried on 6-in. channel-irons attached to a horizontal frame of 7-in. channel iron, and the uprights are of 3-in. x 3-in. x $\frac{1}{4}$-in. angle construction. Reactors are mounted 4 ft. 2 in. apart on centers. For the conditions illustrated the elevated mounting of three reactors per feeder circuit with associated transformers was less expensive than the use of a self-contained unit including two potential and two current transformers in a tank under oil with bushings on top and with low-mounted reactor.



Feeder bay contains three elevated reactors and auxiliary transformers mounted to minimize wiring runs

General view of crane and steamship "Hellen"

New Type Crane and Hoist

By G. A. CALDWELL
General Engineer
Westinghouse Electric & Manufacturing Company

Motor-generator set used as exciter for main alternating-current crane or hoist motor to give dynamic control in lowering operations.

Principles used and a description of the application.

WITH the ordinary shop crane, where speed control in the lowering direction is not required, satisfactory operation with alternating-current power is obtained with a wound-rotor induction motor and a plain reversing drum controller. It is quite evident, however, that with this type of control it is impossible to run at any speed below synchronous speed in the down direction when the load is overhauling. Cranes of this type frequently are equipped with a mechanical load brake which prevents the crane from lowering its load in excess of the synchronous speed of the motor and demands that the motor supply positive power to the gears to lower a load regardless of the overhauling torque exerted. This prevents excessive lowering speed, but gives no speed control below the synchronous speed of the motor.

To meet the requirement of definite speed control of a.c. motors with overhauling loads a scheme that is simple and yet very effective is to convert the a.c. motor into an a.c. generator when lowering a load. This is done by supplying a small low-voltage motor-generator set which is used to excite the stator of the a.c. motor. If the rotor is revolved with the stator excited with d.c. power an a.c. voltage is generated in the rotor and is directly proportional to the speed of the rotor and the strength of the d.c. field. If the rotor is connected to an external resistor it absorbs the power that is generated by the rotor. The power is supplied by the overhauling load and every overhauling load exerts a definite torque on the motor. This torque must be balanced by a counter torque and the speed at which the rotor must run to furnish the counter torque can be regulated by the amount of resistance placed in the rotor circuit and the strength of the d.c. fields. If the strength of the d.c. field is held constant and the rotor resistance is increased, the rotor must run at a higher speed in order to generate an increased voltage to make the necessary current flow. By using the

proper d.c. field strength the secondary resistor, that is normally used for acceleration in the hoist direction, will give the desired speeds in lowering the overhauling load. The d.c. field strength may be controlled by varying the generator voltage or by changing taps on a resistor connected in series with the stator and generator.

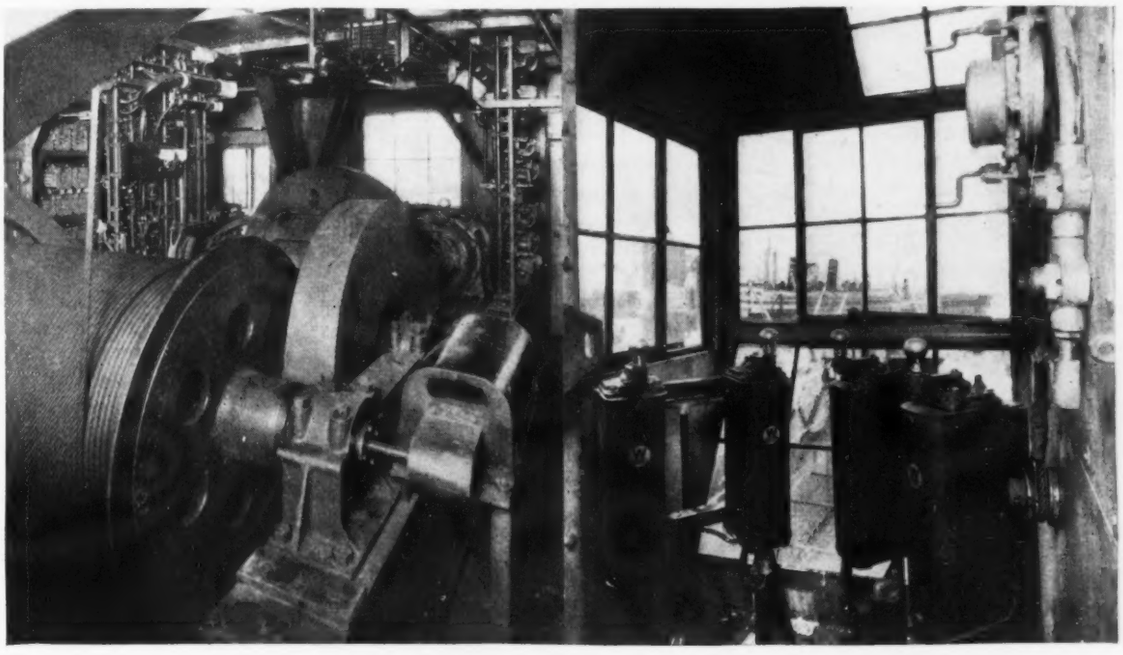
The scheme of connections is shown in an accompanying illustration and is the same as an ordinary plain reversing a.c. controller except that provision is made for connecting the stator to a d.c. generator. Motors of this type usually have the stator winding connected in Y and good torque conditions are obtained by energizing only two legs of the stator winding. The resistance of the two legs in series is such that 32 volts d.c. is sufficient to circulate a d.c. current in excess of full load a.c. current. Calculations and tests indicate that with two legs of the winding energized approximately 1.3 times the full load current is required to give the same field strength as when the motor is energized with three-phase, a.c. power. A braking torque equal to approximately 150 per cent of the a.c. full-load torque may be easily obtained. Reference to an accompanying illustration indicates the speed torque characteristics obtained with varying amount of resistance in the secondary circuit, one case being with the stator energized with three-phase a.c. power and the second case with d.c. power. The motor represented by these curves is the ordinary hoisting type of wound-rotor induction motor having a pull-out torque equal to 225 per cent of full load torque. The line *AB* represents full load torque and where it intersects, the various characteristic curves indicate the speed at which the motor will run when operating at full load with that amount of resistance in the secondary circuit. If we assume that the hoist has an over-all efficiency of 80 per cent, a load that will require full load motor torque to hoist would exert 64 per cent of full load torque in lowering. Therefore the line *CD* represents the overhauling torque of a load that requires full load motor torque to hoist. The curves for the lowering circuit are on the basis of having 1.3 times full load a.c. current flowing through the windings and where the characteristic curves intersect the line *CD* represents the speed that can be obtained by d.c. lowering of the same load.

A Brooklyn installation

A 20-ton gantry crane using this type of control has been built recently by the Industrial Brown Hoist Corporation of Cleveland for the Robins Dry Dock Company of Brooklyn, N. Y. It is evident that a crane of this type doing the work required at a dry dock has no definite duty cycle, but must handle a wide range of loads. In many cases it is also desirable to handle loads in the lowering direction at very slow speeds and yet be able to lower the light loads at higher speeds. For this type of service the a.c. dynamic lowering controller is ideal.

The crane has four separate motions, each controlled by an individual motor and magnetic controller. The main hoist and the boom hoist motions are each driven by a 100-hp., three-phase, 25-cycle, 440-volt, 710-r.p.m. wound-rotor induction motor with a motor-mounted brake and have the special a.c. dynamic lowering control.

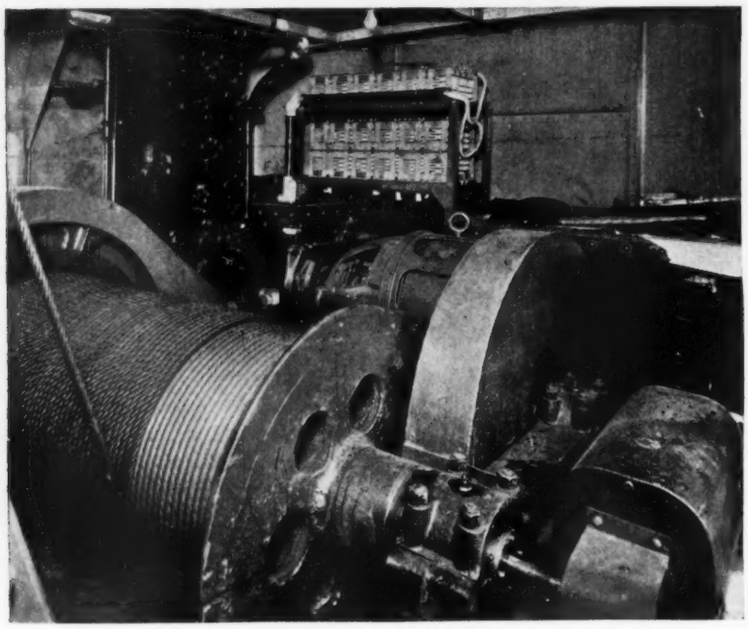
The rotate and travel motions are driven by 50-hp., three-phase, 25-cycle, 440-volt, 710-r.p.m. wound-rotor induction motors. Each motor also is equipped with a magnetic brake, the rotate motion having a motor-mounted brake and the travel motion a floor-mounted brake. The travel motor is totally inclosed, since the motor is exposed to the weather and the service is rather intermittent. The travel motor brake, shown in an accompanying illustration, is equipped with an air dashpot in order that the brake will set gradually and give a smooth deceleration. This avoids any tendency to tip the crane due to a sudden setting of the brake. The two motors



(Left) Main hoist drum, motor and control and rotate motor and control. (Right) Operator's cab showing master switches, foot-operated push button and Martin-Loomis weight indicator

are equipped with the ordinary plain reversing type of control. All motions are controlled from the master switches in the operator's cab.

The motor-generator set which supplies the d.c. power is rated at 9 kw. and the driving motor is a standard squirrel-cage induction motor. The motor-generator set also supplies power to the brakes, which are equipped with 32-volt d.c. shunt-wound coils, and to the definite time accelerating relays.



Boom hoist drum, motor and control

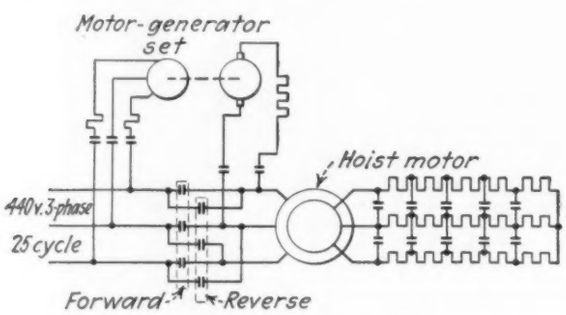
The control for the boom and main hoist is of the full magnetic type and operated from a six-point master switch. In the hoist direction the motor can be accelerated point by point on the master switch, but if the master switch handle is moved over rapidly to the last point, the motor is accelerated automatically by the action of definite time delay relays. Slowdown in the hoist direction is obtained by slowly bringing the master switch handle back toward the off position.

On the first point in the lowering direction the stator is energized with d.c. current and all resistance is cut out of the secondary circuit. If a heavy overhauling load is on the hook, the load will be lowered at approximately 10 per cent of full load speed. As the master switch is moved toward the full on position more resistance is cut into the secondary circuit and the motor speed approaches the synchronous speed of the motor. If the load is not overhauling, the motor will not start until the master switch is moved to the last point, and on this point the d.c. excitation is disconnected from the stator, the a.c. power applied and the motor is automatically accelerated and runs in its normal manner and lowers the light load at practically synchronous speed. As the master switch is brought back to the off position the a.c. power is removed, d.c. power applied and the motor is decelerated by dynamic braking, the braking effect becoming greater as the master switch approaches the off position.

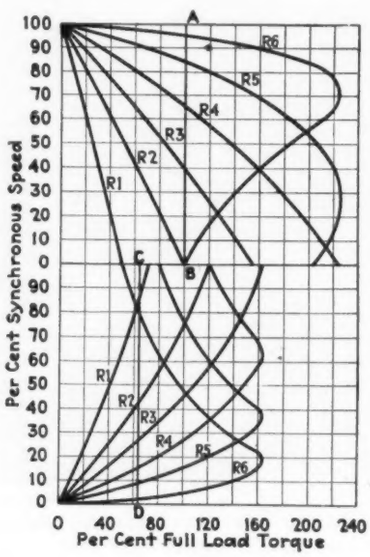
The control for the travel and rotate motions do not have the sustained overhauling load conditions that are obtained on the main hoist and boom hoist motions, so that it is not necessary to supply the dynamic braking scheme. The control is of the plain reversing plugging type, with the acceleration automatically controlled by means of definite time accelerating relays. Since the rotate motion is frequently plugged a foot-operated push button is supplied to prevent the magnetic brake from setting when the master switch goes through the off position.

Power for all motors is fed from a protective panel on which is mounted a feeder contactor and overload relays for each motor. The panel also contains overload relays for the motor-generator set and push button for starting the set as well as a generator field rheostat and generator voltmeter. Any overload on any motor removes all motors from the line by dropping out the feeder contactor. This contactor also drops out on low voltage. All master switches must be brought to the off position to reset the contactor.

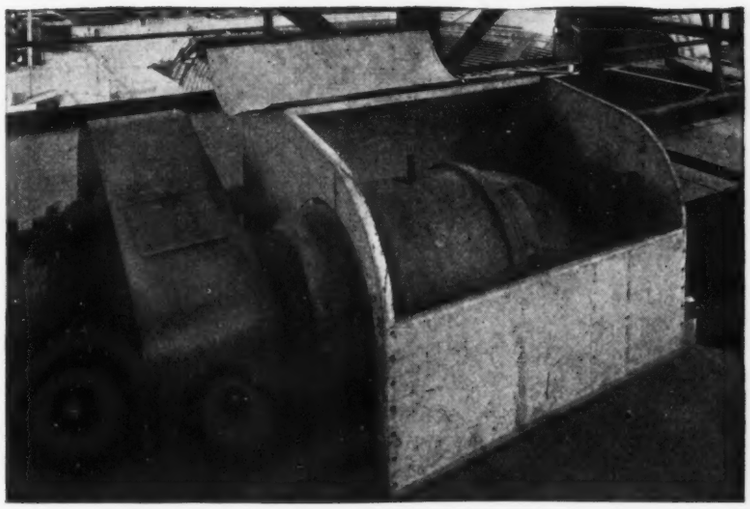
The crane is equipped with numerous safety features. One consists of a foot-operated push button which must be depressed in order to operate any motion of the crane. Releasing this button removes power from all motors on the crane by dropping out the feeder contactor. This feature means that the operator must be in the cab at all



Schematic diagram of connections for a.c. lowering control



Speed-torque characteristics for a.c. (top) and d.c. (bottom) excitation on wound-rotor induction motors



Totally inclosed travel motor and magnetic brake with air dashpot

times in order to operate the crane and automatically stops the crane in case of accident to the operator. The control is also arranged so that it is impossible to operate unless the motor-generator set is running and there is d.c. power for the brakes and dynamic braking. Traveling nut limit switches are supplied for the main and boom moist motions to provide overtravel protection in the hoist direction.

The crane is rated at 20 tons at an 85-ft. radius, but the boom can be lowered so that this radius is approximately 110 ft. At this radius a 20-ton load would tend to tip over the crane and is unsafe. A Martin-Loomis weight indicator is used to indicate the load being hoisted and the radius of the boom. A calibration chart indicates the maximum load for any radius of the crane, so that the operator is able to tell at a glance if he is exceeding the capacity of the crane.

Although the a.c. dynamic lowering type of control has not been widely used, it has some detailed advantages when d.c. power is not available: (1) It gives a performance comparable to d.c. motors and control and yet uses the cheaper a.c. motor and power; (2) the motor-generator set required has only about 5 to 10 per cent of the capacity that would be required if d.c. motors and control were used; (3) gives absolute speed control in the lowering direction regardless of the load being handled.

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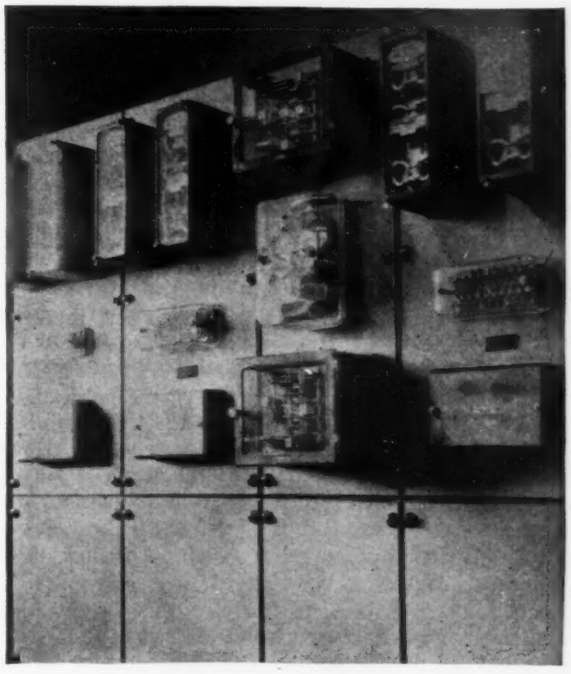
Switchboard Designed for Future Check Metering

At the West Concord 10,000-kva. substation of the Edison Electric Illuminating Company of Boston four three-phase, four-wire, ungrounded neutral, 4-kv. feeders supply energy to the town distribution system. Each circuit is provided with three-shot automatic reclosing circuit breaker relays, ammeter, watt-hour meter, reactive kva. meter and voltmeter. The four circuits are also equipped with a General Electric totalizing demand meter. In contracting to supply energy to the town the company provided switchboard space for duplicate metering facilities, with the addition of a power-factor indicator, in case the town desires at any time to install check metering on each feeder and for the group. It was desirable to economize space in this metering installation, and this was acomplished by mounting all initially required equipment on the upper sections of five panels of a special metering switchboard, leaving the lower sections to carry the future duplicate equipment. Apparatus common to the present and future installations is centralized on the upper section.

Four feeder panels, each 22 in. wide and 4 ft. high, carry the metering equipment for individual feeder indication and recording. The totalizing equipment is mounted on a fifth central panel 18 in. wide. The lower sections, 3 ft. 6 in. high, provide space for future duplicate metering facilities, with symmetrical disposition in line with the initial facilities for each feeder and for the group of four. Thus the present and future facilities are disposed of in an over-all length of 8 ft. 10 in., and with a switchboard 7 ft. 6 in. high, and if the duplicate installation is ordered but one piece of equipment, the second relay demand meter for the feeder group, will be mounted on the rear of the board.



Compact switchboard installation for metering energy sold to the town of Concord, Mass.

The totalizing panel at the center is flanked on each side by two individual feeder metering panels. Check meters will be located on the bottom panels at the option of the municipality.

Selling Farmers Electricity on Community Basis

By MAURICE C. BURRITT

Public Service Commissioner State of New York

I WONDER if some of us have not been guilty of underestimating the amount and the value of the farmers' electrical business. We have talked about 3 to 5 per cent of the total use. Farmers still constitute nearly 25 per cent of the total population, and it is probable that this number plus those who live in the country will never be substantially less and very probably may be more in states like New York, with large suburban areas.

There are already a considerable number of farmers—not agriculturists—in the state, whose annual consumption of electricity exceeds 15,000 kw.-hr. Available data also show that many farmers have more than doubled their use of electric current in the last three or four years. Farmers are both domestic consumers and commercial, even power users, all in one (15 per cent of the total horsepower used on farms is supplied by electric power).

We must not overlook, either, the distribution of farm load, nor its stability, the wide variety of use, both within and without farm buildings, and the time of such use. The essential character of the life and business of the farmer is such as to make his business a most desirable one to add to urban business, which is at times a combination of peaks.

Large blocks of the territory in this state could be completely served now as a unit area, without loss to the serving company. Instead of installing service facilities, piece by piece, why not electrify such areas as a whole and at once? I am hoping that some one will have the courage and the foresight to tackle such a job (one company is about to do so on a small scale), to help in the determination of which is practicable in area electrification and to assist in defining the practical limits of rural line extensions.

To the thousands of farmers who do not have, but would use, electric central station power if they had it, the question of line extensions is of the utmost importance. In general, the lines nearest the towns and in the densest population have been constructed. The hardest part of this problem remains, namely, to serve the more scattered rural population with less customers per mile. The requests and complaints to the commission on this subject of line extension constitute the largest group of rural complaints which come to us. I believe that the problem of line extension to reach the great majority of farms is even more important than the amount of the rates.

Line extensions on an area basis

Obviously the greatest deterrent to extensions is the inability or the unwillingness of rural users to meet the necessary share of the cost in the form of minimum bills. There is much to be done in the way of education and demonstration to show the economic value, labor-saving efficiency and great convenience of electric devices to those who, perhaps unfamiliar with all these great advantages, may be unwilling to incur an obligation to pay a minimum bill, small though it may be. However, the real objection in most cases is actual inability to take on additional financial obligations.

It is asserted that the average cost of line construction is between $1,800 and $2,000 per mile, and that it ranges upward to $2,400 or $3,000 under certain conditions. Under the "Adirondack plan" these costs are averaged at $1,600 per mile, on which valuation 16 per cent is computed annually for carrying charges. On an average I believe that this is, or should be, more than ample.

It is entirely possible that this cost may even be reduced under certain circumstances. Please be assured that I am not advocating a lower standard of construction. I think that our experiences with farmer-built telephone and electric lines in storms and under severe winter conditions have been sufficient to convince all of us of the necessity of maintaining standard construction. Substantial lines have been built in this state within the

**Excerpts from "Farm Electrification Problems," an address by Mr. Burritt at the 26th annual convention of the Empire State Gas and Electric Association.*

past year or two at from $900 to $1,200 per mile, and in one case I am informed that a 2½-mile line is being constructed at the present time which will not cost much over $500 per mile in actual cash outlay by the company.

Can labor cost be reduced?

One of the chief means of reducing cost is by using local labor—in many cases farmer labor. Many farmers are perfectly willing and able to dig pole holes on their properties as specified by the company, without cost to the company, when they are unwilling or unable to furnish the cash to the company to do this. Moreover, farmers rather resent the idea of bringing labor which costs twice as much as they are able to get for their own services from a distant point on an eight-hour-day basis and charging the cost to them. It may also be true that certain items are charged against this line for which a guarantee is asked, which are not similarly charged in the city. Other means of effecting economies in rural line construction are the utilization of the summer period for rural construction and keeping down overheads.

On the principle of community interest, I believe that the costs of line construction should be averaged out over as large an area as possible. This means an area rather than a piecemeal plan. Construction of short stretches of line a piece at a time is expensive. If a considerable amount of construction could be effected on a single job costs could be materially reduced.

Agriculture is an infant industry so far as it is concerned with the use of electricity. It has always been the principle of this country to protect and foster infant industries. I believe that the question is not whether the utility should make unprofitable extensions, but rather should it make extensions which have no indication of ever becoming profitable. If the prospective business is such that it will in time justify the extension, I think the discrimination is no more unjust, nor the preference more unreasonable than has been standard practice in developing the power load. Surveys should help to allay the fear which some companies apparently have that they may be asked to make extensions to the last man and to every area, however uneconomic and costly. This should not be done. Electric line extensions should be limited to areas in which they may be economically used.

There should be no basis in land classifications for differences in rates or extension costs. The differences will rather be in where to extend and where not to extend. The question of unreasonable preferences should not arise in cases where extension costs are averaged, any more than where rates are averaged. Does any one contend that each customer in the city pays the exact costs of serving him and no more? Do power, commercial and domestic classes each pay on the basis of proportionate cost to serve them plus a fair profit? The public welfare and common interests certainly over-rule such differences as may exist after an honest effort is made to determine what these differences are.

I believe direct subsidies are a last resort, if indeed they should ever be used at all. Long term (twenty year) loans might be desirable or even necessary in some cases. We do negotiate such loans for much less useful purposes than electric line extension. If it is feasible and proper to tax a district for the lighting of the highways, public tax bonds are entirely feasible and proper for the extension of electric lines The former is often

an indirect method of securing something which is not really wanted in order to secure something else that is wanted. The direct method might be better. It is, after all, simply a different way of paying for extensions and a matter of legal authorization.

Community basis for rates

There is much to be said in favor of building a rate upon the basis of a community as a whole. The principle is the same as that by which a city located in a particular county contributes to the construction of highways, parks, the general development throughout the country, or the metropolitan district, as well as within the city itself. The country also contributes its proportionate share in the same way. The communities' interests are or ought to be common, and the advantages of an equitable or low rate for electricity should be extended to the country which is naturally tributary to or served by the city, as well as the city itself. To base a rate solely upon a rural area is not only to increase the burden, already heavy, and further to delay the bringing of electricity to many farms, but to go contrary to modern economic and social development.

It has been suggested that few rural lines pay on a strict allocation of costs. I challenge the statement. In the first place there can be no strict allocation of costs. It is all a matter of judgment and experts differ.

Furthermore, many of the so-called farm lines are loaded with a number of rural residents—not farmers—with a very low purchasing power. I see no justification for placing the blame for these conditions on farmers. If a man lives in a suburban community and works for a city industry, isn't he just as urban as though he

lived in the heart of the city? I believe in general that the farm lines which are actually built to economic farm units are paying as well as most other similar investments of the utility at the present time. No one would claim that every present customer is charged exactly his cost of service, so why should the question be given so much importance, simply because the density of customers is lower?

Greater effort should be made to stimulate kilowatt-hour consumption and less weight given to the number of customers per mile. The real job is to build up a total load on the line. The question has also been raised as to whether the state or the locality should absorb the service charge portion of the rate or the rural consumer pay it himself. I believe that the consumer can and should pay. This can often be worked out by reasonable demand charges not so large as to defeat their purpose. The amount of the rate is not as vital as having current available and good service. The first essential in the making of a satisfactory rate is to make sure that the small consumer has an opportunity to use such an amount of current for his minimum charge as will not result in his paying an exorbitant rate per kilowatt-hour, even though he uses but a few. Fairness and justice are thus given to the small consumer. Further reduction should be in the higher brackets of use, so arranged as to encourage and induce the use of additional electric equipment.

Financing wiring and equipment purchases

The inability of farmers adequately to wire their premises and to purchase all the equipment which they would like to have and which could be used economically and satisfactorily is a real limiting factor in rural electrification. When farmers are obliged to economize rigorously on their wiring and on their electric equipment, they seriously limit their ability to consume an amount of current sufficient to overcome the minimum bill and thus to meet the minimum guaranty to the company. This factor is a much more limiting one than the farmers' ability to pay for the current once the wiring and equipment have been installed. Could a satisfactory means be found of enabling the farmer adequately to wire and equip his premises at the outset, the question of line extension and guaranty upon them would be largely solved. Moreover, such use would secure a lower rate quicker than almost anything else. It would mean refrigeration, cooking, pumping and power uses, added to the normal small use by lights and minor household equipment which is now the rule in so many cases.

In this situation financing is the real problem. The Federal Intermediate Credit Banks should be of service at this point, but my experience with them in other directions has been such as to indicate that it is difficult to make the necessary guarantee and overcome the red tape so as to make them really practicable and useful. Companies have done much to help farmers finance wiring and equipment, but there is some question as to the desirability of such aid.

Let the local bank finance the farmer on notes of adequate duration and then set up some sort of a revolving fund, bond issue or credit corporation to discount the local banker's notes for this class of loan. This would give a local man whose business is to judge credit the privilege and duty of ascertaining the soundness of such paper. If the Intermediate Credit Bank's requirements could be liberalized to take care of this situation this method would be almost ideal.

Educational program needed

There is one additional factor which, to my mind, is of outstanding importance at present. There is much to do in the way of education, especially of those farmers and countrymen who have not experienced the economies and the conveniences of electric service. There is very much to be done in the way of explanation of the nature of electric current, teaching the use of appliances, and generally in the demonstration of the uses of electricity. I want to commend especially the employment of special men to work on the rural problem who understand it and who give their primary attention to working out these problems. I am certain that the work of such men during the past two or three years has been responsible for very much of the progress which has been made in this state. Nothing is more important in the solution of the educational phase of the problem.

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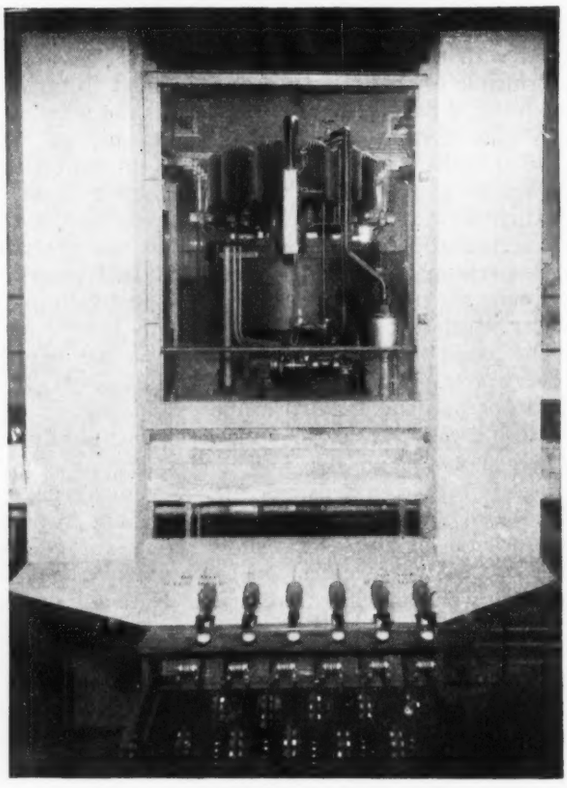
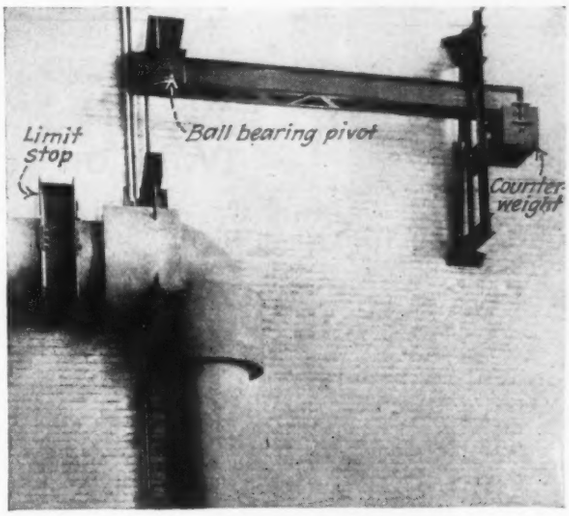
Protecting Leads to Mercury-Arc Rectifier



Compactness and neatness of appearance characterize the later installations of mercury-arc rectifiers for street and elevated railway service on the system of the Commonwealth Edison Company. This unit is installed in the School Street substation. A protective barrier covers the open connections on the top of the six-phase transformer set on the basement floor and transite raceways inclose the buses rising from it to the rectifier.

Counterweighted Hanger Supports High-Pressure Piping



Provision for taking care of the large expansion and contraction of the steam piping at the 1,250-lb., 750-deg. F. station "A" plant of the Pacific Gas & Electric Company in San Francisco was provided for by counterbalanced hangers of the type shown in the accompanying illustration. This particular hanger has a weight of 1,350 lb. at a lever arm of 12 ft., which counterbalances the weight of the pipe acting through a distance of $8\frac{3}{4}$ in. at the ball-bearing pivot support. The weight of the pipe is 26,000 lb. A channel-iron collar serves as a limit stop for maximum movement.

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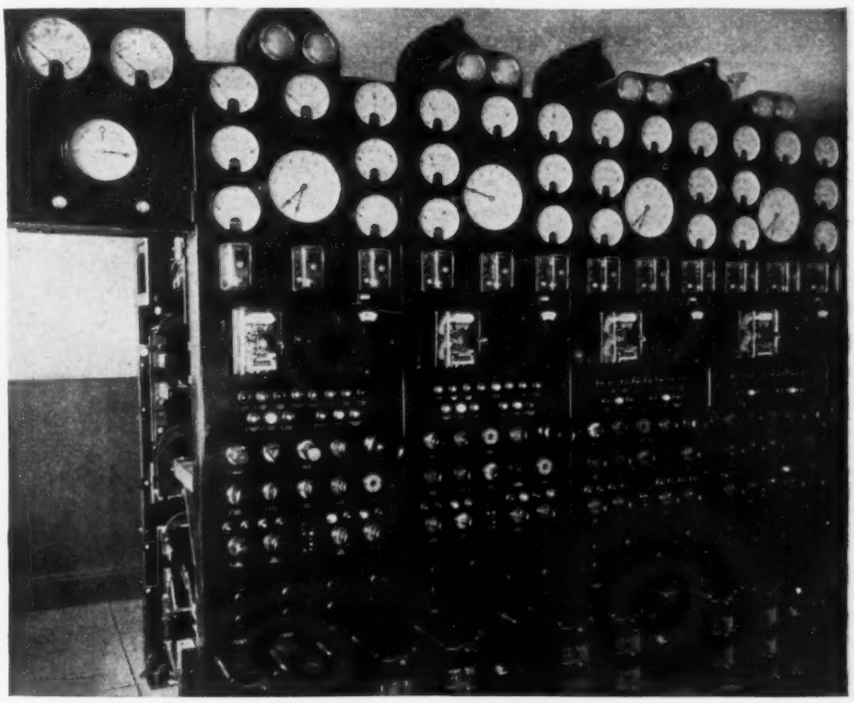
Central Control for Large Hydro Plant

Operating conditions at the Saluda River (S. C.) hydro-electric station of the Lexington Water Power Company, part of the Associated Gas & Electric System, made necessary the control of the entire plant from one point, according to C. R. Kemp, electrical engineer W. S. Barstow & Company, Inc. The control panel illustrated is located at one end of the building adjoining the turbine room and is but one of several switchboards which provide for control and supervision of all plant operation. In this installation there is indicated on the control panel graphic kw., reactive kva.-hours, kilowatt-hours, amperes per phase, volts and synchronism for each 110-kv. circuit. For the control of the outdoor equipment wire supervisory control is used.

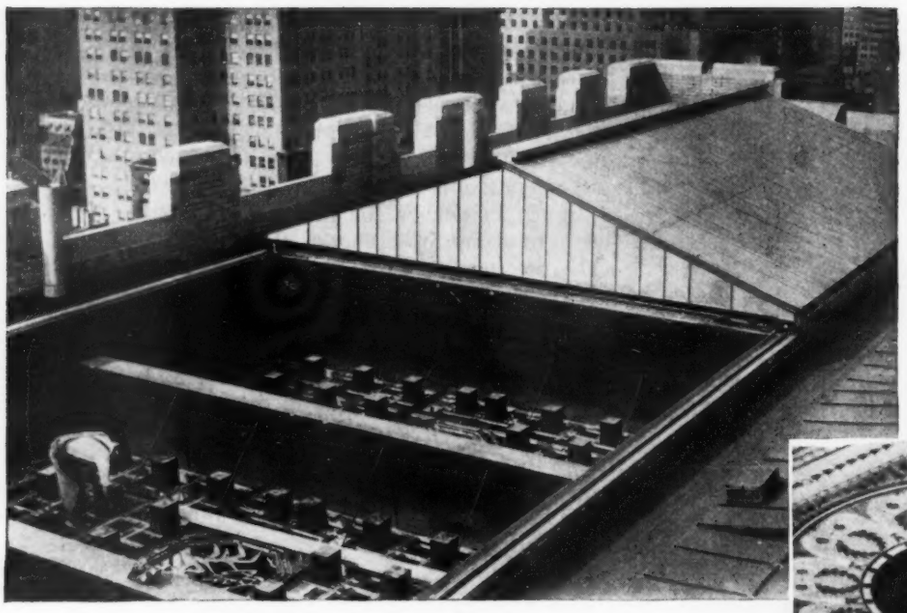
Control switches for the regular starting or shutting down of a unit are placed on the generator board together with the usual indicating meters for the generator and exciters. The operator in the control room is able to control the penstock headgates, butterfly and bypass valves, governor oil-pumping systems, lubricating oil-pumping equipment for starting, exciter rheostats, voltage regulators, and in fact everything necessary to start and load the unit from rest after brief shutdown such as is usual.

The control system for these units is so designed that the operator has at all times an indication of the condition of essential hydraulic and auxiliary apparatus. Green lamps on the generator control boards indicate, when illuminated, that main power transformer temperature and cooling-water supply are normal, bearing temperatures, oil level and cooling water normal, governor accumulator tank oil pressure and oil level normal, together with the proper operation of the preferred governor pump; the butterfly valve is in the normal operating position, the generator air brakes are released, and the safety solenoid on the governor is energized. The extinguishing of any of these lamps will give a mechanical trouble signal alarm and at the same time energize a mechanical trouble white signal lamp over the switchboard of the unit in trouble. A similar lamp is lighted for electrical troubles. A small white indicating lamp operated from a sector commutator on the generator shaft advises the operator of the commencement of rotation at starting or the cessation of rotation at stopping the unit.



Generator switchboard for centralized operation of 130,000-kw. plant

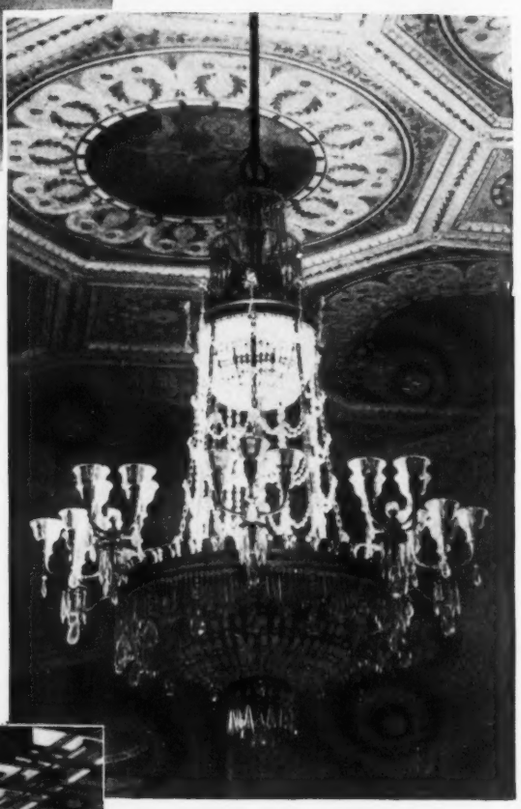
Electricity at the New Waldorf



Removable roof pours sunshine or fresh air into tea room

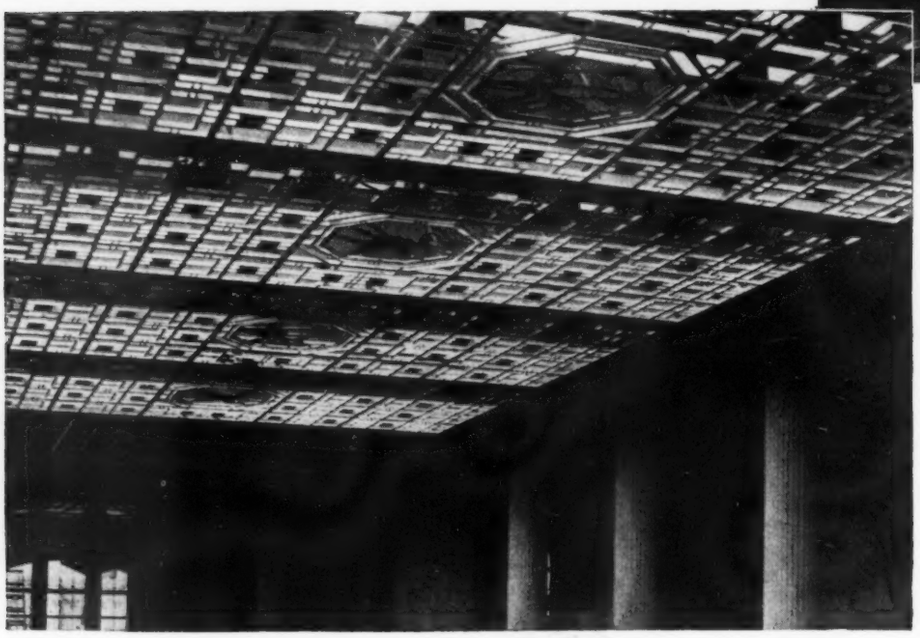
Motor-operated, by push-button control, two huge roof sections slide quickly over the open space of this hall, permitting the entrance of unlimited quantities of light and air. The small black boxes are unobtrusively mounted reflectors and sources for colored lights.

WHEN New York bid farewell to the Waldorf-Astoria that the Empire State Building might rise upon the site many a figurative tear was dropped for departed glories of the premier hotel of the gay '90s. Today a new Waldorf-Astoria has been hurled skyward in the midtown section and old glories bid fair to be surpassed with conservative modernism. Electricity, of course, plays its inevitable and indispensable rôles. Here are two examples.



Lighting the ballroom

Clinging reminiscently to the form and outline of the traditional chandelier this light source at the new Waldorf supplies wholly indirect lighting. Glare is avoided, good practices observed and traditions maintained in spirit with the remainder of the decorative scheme of this room.



Day or night is all one here

Through this grille pours natural light when the roof sections are open or soft colored artificial light when the sections are closed. Fresh air is ready in unlimited quantities by day or night when the weather is fine.

High Lights of International Illumination Congress

By a UNITED STATES DELEGATE

No more appropriate setting could be found for a meeting of the delegates and lighting experts of the world than amid the old colleges of Cambridge in England, where sessions of the International Illumination Congress were held last month. Certainly the spirit of Clerk Maxwell, who enunciated the electromagnetic theory of light, must have been present, and the lecture of Sir Arthur Eddington on the light of the stars was a fitting accompaniment.

The sessions were held in Trinity College, whose master, J. J. Thomson, has contributed so much to the atomic theory which is at the foundation of light production. Not far away was the Cavendish Laboratory, where Rutherford, Aston and others are at work on the secrets of the atom.

Certain changes were made in the mechanics of operation of the commission's activities, but the most important phase—the character of the program—was not adequately discussed. To those interested in the efficient operation and effective results of national and international meetings the one at Cambridge was far from perfect. It was to be hoped that serious attention would be given to the character of the program and the function of a program committee. It seems certain that much more benefit would have been obtained had the program been divided into subjects and had adequate discussions been directed to these, instead of having many parallel sessions with a heterogeneous mass of papers, most of which were not of international scope or of high quality.

Reports of committees were presented along with resolutions to be adopted. Brief allusion to those of most interest show the character of the results accomplished.

Commission to study ultraviolet

The newest step taken concerned ultraviolet radiation in connection with lighting. There was some disposition to be afraid of the subject, but certain countries especially familiar with this development insisted upon official recognition for it. As a result it was decided that the International Commission on Illumination should extend the scope of its study of radiation to include measurements of all radiation emitted by modern illumination throughout the spectrum, although it was specifically stated that these would be of a purely physical nature suitable for the needs of lighting. Few delegates seemed to appreciate that certain leaders in this new lighting development have already contributed a physical foundation for radiation therapy which the medical profession would not have provided for a long time to come.

Attention was given to the vocabulary of lighting to the extent of developing more than a dictionary of terms, although those less familiar with the intracacies of the science found difficulty in realizing the urgent need for many of the desired new terms. A number of new definitions were adopted as well as new symbols.

As usual, heterochromatic photometry received attention, and it was decided to study methods of measuring colored light—a need long recognized by a few but ignored by most photometrists.

The relation of architecture and lighting received much justly deserved attention. Floodlighting, a new development in London and elsewhere, for the first time received technical consideration in regard to the lighting units necessary.

Automobile headlights were discussed with much interest. Automobiles capable of a speed of 30 km. or more per hour require two forms of beams—a driving beam for open roads and a "passing beam" when another vehicle is met.

Factory lighting and school lighting were subjects which received a good deal of attention. Progress in specifications was made, but the appraisal of glare was referred back to the committee. This was to be expected because the report on glare by no means took into account the latest work on the subject. It is necessary to separate the respective effects of glare upon visibility and upon comfort before further progress in understanding and avoiding blare can be made.

Lighting and worker efficiency

Resolutions were passed which encouraged further efforts not only to determine the efficiency in the performance of work but to insure adequate lighting for workers, including those with subnormal vision, so that their vision will be conserved and eye strain, nervous effort and useless work be reduced. As a matter of fact much good scientific work has been done in recent years in the science of lighting to help seeing. Lighting practice does not utilize such knowledge to the fullest extent even now. However, it is interesting to note that more attention is being given to the psycho-physiological phases of lighting. Certainly, good lighting has been retarded by too much consideration of engineering. Lighting in its largest sense is concerned very little with engineering.

Street lighting caused the usual commotion. To one who follows lighting development it seems strange that street lighting should always be a battleground. It is not a highly important phase of the lighting business, and certainly the problems involved are no more intricate than in many other phases. A resolution was passed which called for compiling (1) a complete description of various luminaires, including consumption of electricity or gas; (2) the spacing of the units and their height and transverse section; (3) determination of average illumination over the road surface accompanied by the value of the minimum illumination intensity. It was also resolved to study illumination upon vertical planes and to elicit the opinions of various national committees.

Colored signals were dealt with in connection with traffic. As regards their position, red was standardized at the left or top; green at right or the bottom, and amber (if used) in the center. The lens is to be not less than 8 in. in diameter, and the minimum size of lamp behind each lens is to be 60 watts.

Photometric precision, daylight illumination, colorometry, aviation lighting, education and many other subjects were dealt with, but no startling advances were made. In fact, to a country like ours in which lighting has advanced in many directions ahead of its status in most other countries such meetings as those described cannot be expected to contribute much new knowledge. However, better understanding results, and this in itself is worth while.

Man Power Plus

An analysis of new Russian textbooks. Mechanical aids a curse in America and a blessing in Russia. A study in contrasts

By EDWIN GRUHL*
Vice-President
the North American Company

RECENTLY there was published in this country a little book called "New Russia's Primer," a translation of an official textbook published in Russia in 1930. Its major object was to acquaint the boys and girls in the schools of Russia with the so-called "five-year plan" of construction, which was begun in October, 1928. The introduction to the American translation states that it presents "something of the ideas on which Soviet children are being nurtured today" and also shows the "extreme devotion to science, technology and machinery which agitates contemporary Russia." To me it was of more than passing interest for two reasons—the great emphasis placed on the part electricity is to play in Russia's proposed development and the mistaken impression given about working conditions in the United States.

Electricity plays most important rôle

Electricity, for Russia at least, is cast as the hero in the play, and not the villain—as it is in America by Russian boosters. Lenin is quoted as having said, "Communism is sovietism plus electrification." "New Russia's Primer" paints a picture of poetic beauty in the description of the marvels to be born of kilowatts in the Russia of the future. I quote from it:

> The time will come when the rural districts are electrified. In the city electricity has already won the battle over kerosene; now it is the turn of the village. Light without fire or soot, steady, bright and safe, will flash through the village streets. Thousands of hours will be reclaimed from the dark winter days, from the long autumn nights, by the electric lamp. The peasant will have more time for work, for reading.
>
> And within fifteen or twenty years electricity will become as common as air or water. Everywhere both energy and light will be obtainable in any quantity. Electric machines will work both in the factories and in the fields. Electric trains will dash over steel rails. Electric plows will till the soil. Electric combines will gather the harvest. Electric automobiles will carry the laborers to work.
>
> Everywhere—in the street, in the home, in the factory—noiseless, nimble, stalwart electric servants will work for men.

The rising generation in Russia are permitted that enlightenment. The youth of America are not. There was violent objection when the National Electric Light Association some years ago made available to schools, and distributed at the request of school authorities, copies of a pamphlet entitled "Electricity—How It Is Made and How Distributed." The pamphlet contained nothing more controversial than these statements: "The use of electrically operated labor-saving machinery has made the American worker the best-paid worker in the world. The American farmers use more machinery and produce more per capita than do farmers in any other country." There was plenty of proof behind these statements of fact. Yet this educational effort was roundly denounced. In the words of one violent objector, it "revealed the existence of propaganda machinery hardly paralleled in its extent and effectiveness in the nation's history."

Evidently, then, what is undesirable propaganda in America regarding the benefits of electricity is enlightening education in Russia.

The misstatements which abound in "New Russia's Primer" concerning conditions in the United States cannot be entirely blamed upon the Russians. We have in this country some admirers of the Russian system. In fact, within the last year there has been a flood of books and pamphlets designed to direct our thoughts to communism.

These exponents of the newest economic thought do not actually advocate communism for the United States. They are careful to leave the decision to their readers. But they do uniformly pin the label of capitalism on the United States, and they do advance a thousand reasons for what they term the failure of our economic system. On the one hand, these writers picture the waste of competition as a tragedy; on the other hand, they picture the so-called trusts as a menace—and I assure you they refer to a good many industries besides that to which they apply the name of "power trust." These literary apostles of the school of emotional economics tell us that every method of regulating private enterprise is a failure; that every effort of private enterprise to stabilize employment and assist in insuring against dependency is a deceit. There has even appeared an imitation of "New Russia's Primer" called "America's Primer." It is an apology, not a defense.

America painted as a "mad country"

"New Russia's Primer" refers to the writings of such Americans as authority for some of the ridiculous stories about us which it tells Russian children.

This red primer says we are a "mad country," that we "burn crops," "breed pests," "wreck machinery"; that we "destroy mountains of good iron ore and an endless quantity of horsepower in order, in a few months, to fill rubbish cans."

The red primer is appalled at the money we spend for advertising and astounds the little children as follows: "To read all the advertisements which appear on one day in the American newspapers would require five hundred years. Millions of tons of raw materials and fuel, millions of working days are consumed in order to force people to buy what they do not need."

The red primer's great big scare is this: "After his fortieth birthday a worker is no longer wanted in a factory; at that age the American worker is an old man." Grim fairy tales, indeed, to deceive and scare Russian children—and some Americans who are older, at least in years.

**Abstract of address before recent Great Lakes Division, N.E.L.A., French Lick Springs, Ind.*

We would like to tell the Soviet children that it is true, just as the red primer says, that one automobile king alone — Mr. Ford — owns many factories, railroads, steamships, mines, forests and at least the banks of rivers if not the rivers themselves, and it is true that all of his workers and their families would make a city bigger than all Moscow. But it is not true, as the red primer says, that these people *must* work for Mr. Ford. They like to work for him because they can keep what they earn. We have other very wealthy men, too. There is the newspaper king, Mr. Hearst. One of his estates alone covers 240,000 acres, or 375 square miles, an area one-fifth larger than all of New York City. In it are great halls filled with art treasures, guest houses, libraries and movie theaters, and Mr. Hearst has a private train, a private landing field, and a private zoo. Of course, such great fortunes would not be possible in Russia. Persons such as Mr. Ford would not be allowed to make their own little five-year plan, and persons such as Mr. Hearst would not be permitted to own such a gorgeous home or to write whatever they pleased about the government in their newspapers.

And yet we must give the devils (as Russia doubtless sees them) their due; even Soviet Russia will admit that. Mr. Ford's plan inspired Russia's biggest automobile plant. And Mr. Hearst's newspapers are among the loudest in trying to stir up public interest in public ownership of some, but not all, of the business enterprises of the United States. We do not begrudge Mr. Ford and Mr. Hearst their extreme wealth. They cannot eat their gold; neither can they take it with them when they die.

Finally, for the information of Soviet schoolboys, let us nail the lie in the little red primer that "after his fortieth birthday a worker is no longer wanted in a factory; at that age the American worker is an old man." Why, we cannot elect a man President of the United States until he has passed his thirty-fifth birthday; we have never had a President who was under 40, only one under 45 and only six out of 30 under 50 years of age. Mr. Ford made all his money after he was 40. Our 1920 census showed that 28 per cent of all males over ten years were 45 years and over. Yet of those engaged in gainful occupation a greater proportion, 31 per cent, were 45 years and over. In 1930 more than 36 per cent of the employees of the River Rouge plant of the Ford Motor Company were over 40. Why are such figures lacking for Soviet factories?

It is probably useless to attempt to correct such impressions of America as are being planted in the minds of Russian children. There is no free press in Russia, and nothing may be published which in any way reflects on Russia's rulers and their plans. Her trustful children must remain in blissful ignorance. But we may succeed in small part in correcting such nonsense in this country and protect its American sponsorship.

Man power plus for America and Russia

Let me again quote from the red primer: "Every American worker has 230 mechanical helpers, every Soviet worker has only 20." Looking backward, I find the American worker had about 1½ hp., or nearly 30 mechanical helpers, at his disposal in 1899. This would indicate that Russia today has less mechanism than we had in the United States at the end of the last century. An estimate of the mechanical horsepower available in the United States today indicates prime movers of 21¾ hp. per wage earner. On the basis of 20 man power per horsepower each wage earner now has 434 mechanical helpers at his disposal instead of 230 as stated in the red primer.

I wish I were as gifted as the author of "New Russia's Primer" to picture the 434 mechanical helpers with which every American worker is surrounded. Says the author of the red primer:

> Remember, according to our calculations Dnieprostroy will give to us 18,000,000 mechanical workers. This army of helpers will not remain idle. We shall compel it to melt iron, steel and aluminum. to build steamships, to bake cement and porcelain, to manufacture chemical products, to produce fertilizers for the field, to illuminate cities, to irrigate arid lands. Every living worker in the factories of the Dnieper Union will be assisted by 700 mechanical helpers. And such a union we shall organize around every great electric station.

Electric helpers for every worker

While these are still only calculations, the imagination of every employee in American electrical supply enterprises cannot help being stimulated, and we must all applaud the prospect of any worker being assisted by 700 mechanical helpers, all of them electric. Seven hundred mechanical helpers for each living worker means only 26,000 workers in the entire Dnieper Union. Mr. Ford's River Rouge plant alone has 92,000 workers. In 1929, according to the manufacturing census of that year, every wage earner in the factories of the United States had 5 hp. at his elbow, of which nearly 4 hp. was electric. At the rate of 20 man power per horsepower he had 98 mechanical helpers, of which 78 were electric. We still have ample necessity for extension of the blessings of electricity in the United States —if restrictive legislation advocated by the friends of Russia does not prevent our doing so.

Following the communistic theory that everything in

a capitalistic country, such as the United States is supposed to be, must be bad and that everything in a communistic country, such as Russia proposes to be, must be good, we are not surprised when these same *mechanical aids are pictured as a curse here and a blessing in Soviet Russia.*

Russia's red primer makes these extraordinary statements: "In America the machine is not a helper to the worker, not a friend, but an enemy. Every new machine, every new invention, throws out upon the streets thousands of workers. And the American worker despises the machine which takes away his bread." And then, the red primer says: "But how is it with us? The more machines we have, the easier will be the work, the shorter will be the working day, the lighter and happier will be the lives of all."

Again we observe a great difference in the benefits gained by Russians and the disadvantages which they say penalize Americans.

Machines make work easier

There is, of course, no difference as to the effect of labor-saving devices, wherever they may be used. They will temporarily displace man power as quickly in Russia as they have done in the United States. But in this land of opportunity work has increased with the increase in labor-saving devices. Taking the 60-year period from 1870 to 1930 we find that population of those between 15 and 65 years of age increased two and one-half times, while the number of gainful workers excluding agriculture increased five and one-half times, and this improvement has been progressive in every decade of these 60 years.

Some sixty years ago about one-half of all gainful workers were in agricultural pursuits; today only about one-fifth of the workers are in that field. There is no question that, in the United States at least, labor-saving devices have made work easier, have shortened the working day and have made the lives of all of us lighter and happier—just as has been predicted for New Russia.

Mechanical helpers have done one thing in America which "New Russia's Primer" does not dare to mention. They have increased the wages, income, savings and the independent spending power of the American worker, a prospect which cannot be held out to the vast industrial army in Russian servitude.

Working conditions in America and Russia

The average monthly wage in 1930 of industrial workers in Soviet Russia was 84 rubles, or about $43. The average of all workers, including agricultural, was 73 rubles, or $38 a month. As a means of forcing the idle to work, the Commissar of Labor on October 9, 1930, "ordered the cessation of insurance payments." According to the 1931 American Labor Year Book:

> On October 20 the central committee of the communist party decided that the labor exchanges must register, restrain and distribute practically all workers—union and non-union, industrial laborers and farm hands—and take drastic action to end the high turnover in the factories and the mines. On December 17 the government announced that workers must not change jobs without permission, or refuse employment, under penalty of no job at all in industry or transportation for six months. Wages for each occupation were to be made the same all over the country to remove one incentive for change.

I quote from Robert Sibley, a United States delegate to the World Power Conference in Berlin, who inspected Russian construction camps in 1930:

> If there is one thing I can speak authoritatively on, it is camp life in electric power construction work of America, because twelve years of my life was spent inspecting and visiting practically all of the outstanding work of this type in western America at least, and I know that what I saw with my own eyes when I was at the Dnieprostroy could in no sense of the word approach the sanitary protection for the workers observed in American camps of similar type, nor in comfort and hygienic layout provided for American workers.
>
> And as for the food given the workers, I can only say that if American workers under standards of living in vogue in America were even offered such food, not a single worker would remain on the job.

Let us now examine how far Russia has developed her mechanical helpers in comparison with ours. Russia's mechanical helpers, if we accept "New Russia's Primer," aggregate 20, which compares with the status in the United States in the last decade of the nineteenth century. At the conclusion of its five-year plan of construction Russia will still be woefully behind the United States today. At the end of the five-year plan the Soviet Union expects to have installed some 7,700,000 kw. of electric plants. This includes capacity of all central stations, local and rural plants and plants in factories. This happens to be the identical amount that was installed in public utility plants in the United States in 1912. Today the total electric capacity of public utility plants in this country is 34,000,000 kw. and in factories 7,000,000 kw., or a total of 41,000,000 kw.

Kilowatts in the five-year plan

Russia proposes to produce 26,000,000,000 kw.-hr. in 1933—incidentally some 300 per cent more than was actually produced in that country last year. The total production of electrical energy in the United States in 1930, including public utility and factory plants, was approximately 114,000,000,000 kw.-hr. If the five-year plan fulfills its predictions, the electrical installed plant capacity in Russia in 1933 will amount to 47 watts per inhabitant; in the United States in 1930 the average per inhabitant was 350 watts. If all goes well, Russia in 1933 will turn out 157 kw.-hr. for each inhabitant. The average in the United States last year was 930 kw.-hr. per capita.

Let us examine our other most important mechanical aid, the automobile. The United States has one passenger automobile for every five people—Russia one for every 5,780 people. The United States now has one truck for every 35 inhabitants, Russia one for every 4,920. We have one tractor for every eight farms, while Russia has one for every 743 farms. A passenger car in the Soviet Union is regarded as a luxury and not a necessity as in this country. For this reason the five-year plan provides few passenger cars.

Nightmare of political control

In quoting from the red primer my purpose has been to illuminate the amazing absurdities of two viewpoints which one would expect to be similar but which are vastly different. We see, then, this preposterous paradox: A red vision of a Russia mechanized and economically supreme by virtue of man power plus electrical horsepower, every kilowatt a blessing; on the other hand, a red (or at least a pink) vision of an America where man power is menaced by electrical horsepower and every kilowatt is a curse. To the Soviet school-

boy and his parents is presented a dream of a Utopia of American machines and American methods, when over Russia actually hangs a nightmare of economic czardom by a relatively small group of politicians. In America we already have what they are striving for, what they are restlessly dreaming about. Man power plus electrical horsepower is a blessing in America because political control of business is not a reality, not a vision—only a nightmare troubling a few scattered minds.

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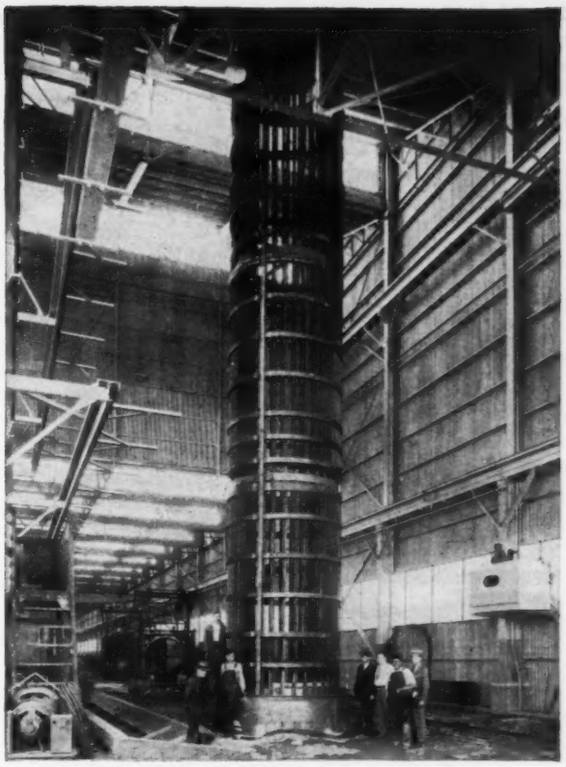
Electric Heat Best Suited for 50-Ft. Dip Tank

Heating of a 50-ft. vertical asphalt tank for dipping pipe in the plant of the Consolidated Steel Corporation at Los Angeles was a job where electricity proved far more economical and superior in every way to natural gas, its only real competitor. The tank was designed to coat welded steel pipe of a maximum diameter of 72 in. and length of 46 ft. at the rate of four lengths per hour with the pipe preheated to 400-425 deg. F. and make-up asphalt added twice daily at a temperature of 300 deg. F.

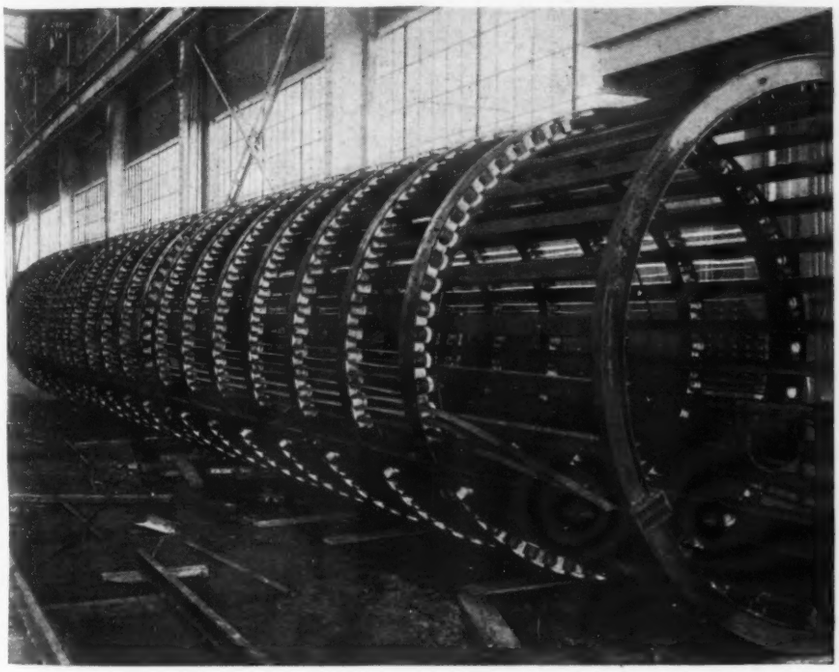
The vertical tank was selected because of the small floor area required, ease of handling pipe, safety to workmen, low thermal losses due to the small exposed area and ease of insulating the entire tank, low temperature gradients due to applying the heat over a relatively large area, low sludging rate, and uniformity of coating made possible by uniform temperature control. Use of gas would have required an expensive heating and combustion chamber external to the tank and would present considerable construction difficulty due to the fact that the tank extended 30 ft. below the water level. Due to the great depth of the tank the possibility of obtaining uniform temperature control became quite remote.



Lowering a 150-kw. immersion-type heating element into a 50-ft. pipe dipping tank

One of the principal factors involved in the consideration of the two fuels was uniformity of coating obtained. Unquestionably, there is a direct saving in favor of electric heat. In fact, it has already been determined that this will easily amount to 10 per cent, and assuming the use of 150,000 lb. of coating per month at a base price of $40 per ton, a saving of $300 a month will be effected in favor of the electrical equipment.

Electric heat made possible the use of an immersion heater specially designed for the job, and occupying a minimum of space. Installation cost was low, since after the heater was built it was necessary only to lower it into the tank by means of an overhead crane. The heating element proper was designed to have about 50 per cent more area in contact with the asphalt than could be obtained if the tank itself were used as the means of transmitting heat. This was done to keep the temperature



This immense immersion heater for an asphalt dipping tank was made by lacing ribbon type resistor around porcelain supports

gradient between the element and the asphalt as low as possible to overcome the possibility of carbonization of the asphalt. Actually, the heating element operates at a temperature differential not in excess of 50 deg. above the asphalt.

The element was divided into three vertical zones, each approximately 15 ft. high, each zone consisting of a three-phase, 110-volt element of 50 kw. capacity, making the total installed capacity 150 kw. The resistor is of the ribbon type $\frac{1}{8}$x2 in., with a total length of 4,500 ft. One of the accompanying illustrations shows the element under construction and the other is a view while it is being lowered into the tank. The construction view shows the manner in which the ribbon type heating element was laced back and forth around special porcelain insulators set between two circular steel bands.

Automatic temperature control was provided for each of the vertical zones, permitting complete vertical temperature control for the entire tank. Provision also has been made for reduced voltage on any of the individual zones by means of manual switches for reducing the input on starting or for holding a working temperature when pipe is not being dipped. The lower element is sufficient to hold the entire tank at working temperature under standby conditions.

The clear diameter inside the heaters is 81 in., while the inside diameter of the inner tank is 94 in. with a clear depth of 50 ft. The inner tank is surrounded by 5 in. of high-grade insulation, which in turn is incased in an outer steel shell waterproofed to keep the insulation dry. This outer shell, in turn, is surrounded by a concrete tank approximately 8 in. in thickness. The tank when full contains approximately 185,000 lb. of asphalt requiring 13,000 kw.-hr. to raise from cold to 375 deg. F. in 90 hours. Standby losses are only about 13 kw. with the cover in place, and when dipping pipe with the cover removed 25 kw. is required. When no heat is being supplied and the tank is covered the asphalt cools at the rate of approximately 1 deg. in every three hours. This equipment was designed and built by the Westinghouse Electric & Manufacturing Company.

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Gypsum Used to Fireproof Cables

Cheesecloth and cement have been found relatively expensive as compared with other methods of fireproofing lead cables in exposed underground runs, especially in connection with excavations for subway construction, etc. A mixture of plaster of paris and sand is being used by the Philadelphia Electric Company. A wooden trough is built to carry the cables, and it is suspended from the beams forming the support for the temporary decking. A low grade of gypsum is satisfactory for the mixture, which is poured around the separated cables. It has proved effective in guarding the lead sheaths and cables against damage in case of a cable failure during construction, and it prevents damage to another cable or the wooden construction materials in case of a cable failure. The mixture has adequate strength but can be removed easily when necessary.

Manhole Protection No Bar to Traffic

Safety nets are used by the Pacific Gas & Electric Company to cover open manholes where men are working. The device illustrated consists of two metal frames hinged in the center and covered with heavy wire. It was designed and built by company engineers. When men are at work in a manhole this safety net keeps pedestrians from falling into the hole, protects workmen from injury due to falling objects and even permits motor cars to be run over the safety net without damage. By being hinged in the center access to the manhole is permitted.

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READERS' FORUM

Reactance Relay Corrections

To the Editor of the ELECTRICAL WORLD:

In my article "Reactance Relays Negligibly Affected by Arc Resistance," in the September 19 issue of the ELECTRICAL WORLD, one or two errors were made.

The word "mostly" in the eighth line of the first page (502) should have been written "wholly." The sentence should read "arc impedance is wholly resistance."

In the table at the end of the article (page 504) all the values of time (fifth column) are in cycles, not seconds. It is unimportant to a high-speed relay what happens to the arc voltage after seconds have elapsed.

In Fig. 3 the title gives the impression that the equation $V = \frac{8{,}750}{\sqrt[n]{I}}$ was deducted from the rather erratic points in the figure. Actually a curve of the equation established by Paul Ackerman and others $\left(V = \frac{KL}{\sqrt[n]{I}}\right)$ was fitted to the points, which merely gave values for K and L, as explained on the next page (504).

In the title of Fig. 5 the word "heat" should read "convection."

A. R. van C. WARRINGTON.
General Electric Company,
Philadelphia, Pa.

Men of the Industry

Famous Electrical Pioneer Honored in London

INTERNATIONAL HONOR was paid to an octogenarian scientist, Colonel R. E. B. Crompton, in London recently. Colonel Crompton, who is in his eighty-seventh year, is one of the pioneers of the British electrical engineering industry. He has been called the English Edison. Senator Marconi spoke and acknowledged that Colonel Crompton had inspired him in any achievement associated with his name.

The gathering was presided over by Frank Parkinson, partner of the firm of which Colonel Crompton is the head. "The Colonel," said Mr. Parkinson, "has been described as the Grand Old Man of the British electrical industry, but he is rather a grand young man, whose pioneer work is the admiration of all connected with the electrical industry today. He was associated with the introduction of the electric lighting of London and other great enterprises, and he has maintained his position as active director of the company he formed many years ago and is electrical manager of one of the great electric supply companies of London." Prof. Luigi Lombardi of Italy also eulogized Colonel Crompton.

Colonel Crompton entertained the gathering with a series of reminiscences, including a description of his visit to Windsor Castle in 1880 to demonstrate the new electric lamp to Queen Victoria. "I am glad to say that our electrical industry is in good health," he said, "and there is greater hope for its future and greater belief in itself than in any other of our industries. I am proud to belong to it." The toast of the electrical industry was proposed by the principal American guest, Prof. A. E. Kennelly of Harvard University.

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HARRY L. ERLICHER, who entered the employ of the General Electric Company as an office boy in the purchasing department, has been appointed purchasing agent, succeeding L. G. BANKER, who retired October 1 after completing 43 years' continuous service with the company. In 1923 when the position of assistant purchasing agent was created Mr. Erlicher was selected for the place, having served in several other capacities in the interim. Mr. Banker entered the employ of the old Thomson-Houston Electric Company in 1888 as a clerk in the purchasing department. He went to Schenectady when that city was made headquarters of the General Electric Company in 1894. In 1914 he was appointed purchasing agent and head of the purchasing department.

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R. E. CUTHBERTSON, secretary of the Ohio Public Service Company since its organization and secretary-treasurer for the past three years, has resigned to enter business for himself in Philadelphia. Mr. Cuthbertson joined the Cities Service organization in 1912 as bookkeeper for the Empire District Electric Company in Joplin, Mo. After serving in various accounting capacities he was transferred to Elyria as secretary of the Lorain County Electric Company. When the Ohio Public Service Company was formed in 1921 he was made secretary.

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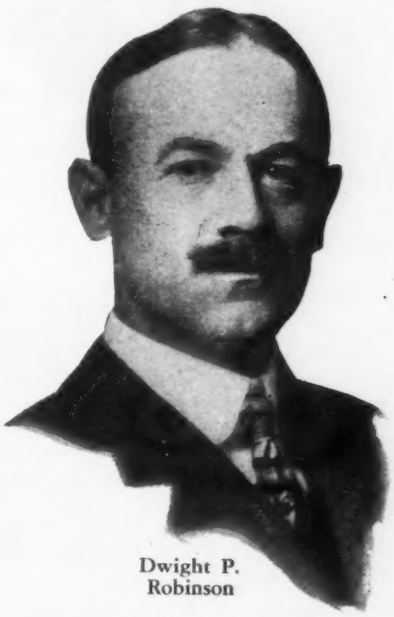
E. M. Chance Heads United Engineers— D. P. Robinson Resigns

DWIGHT P. ROBINSON, president of United Engineers and Constructors, Inc., having completed the work of coordinating the activities of the U.G.I. Contracting Company, Day & Zimmermann Engineering & Construction Company, Public Service Production Company and Dwight P. Robinson & Company, Inc., has resigned as president. EDWIN M. CHANCE has been elected to succeed Mr. Robinson in that office. Mr. Robinson is one of the very prominent figures of the engineering profession in this country, having for more than 40 years been identified as administrator and organizer with outstanding construction enterprises.



Dwight P. Robinson

A graduate of the Massachusetts Institute of Technology, Mr. Robinson in 1893 joined the Stone & Webster organization, with which he remained in various capacities until 1913. He obtained a wealth of practical engineering experience with several of the operating subsidiaries and in 1903 returned to Boston in charge of all engineering. When the Stone & Webster Engineering Corporation was formed he was made president in charge of both engineering and construction activities. Two years later he was admitted to partnership. In 1918 Mr. Robinson resigned from Stone & Webster and, gathering about him a staff of old associates, organized the firm of Dwight P. Robinson & Company, Inc., to carry on an engineering and construction business, specializing in the design and construction of power stations and industrial plants. In 1920 Westinghouse, Church, Kerr & Company, Inc., was absorbed into Dwight P. Robinson & Company, Inc., by consolidation, and in the decade that followed Mr. Robinson had charge of a wide range of power, electrical, industrial and building developments. It was in 1928 that he became president of United Engineers & Constructors, Inc., which has engaged in all classes of engineering and construction work in the

E. M. Chance

United States and abroad. The company will continue to have the benefit of his services in a consulting capacity.

Mr. Chance had been a vice-president of United Engineers & Constructors, Inc., since its formation in January, 1928. Born in Philadelphia, he was graduated from the University of Pennsylvania in 1907. During the following two years he worked in Nevada in metal mines and then until 1913 was chemist in charge of coal preparation, mine-fire fighting and rescue work for the Philadelphia & Reading Coal & Iron Company at Pottsville, Pa.

From 1913 to 1917 he was consulting chemist and engineer for anthracite and bituminous coal mining companies in Pennsylvania and West Virginia.

In 1919 he joined the Day & Zimmermann organization in charge of all engineering and construction work for a wide variety of plants and properties. In 1928 he was elected president of the Day & Zimmermann Engineering & Construction Company.

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WILLIAM SHULER, formerly connected with the Columbia Engineering & Management Corporation in Cincinnati, is now identified with the Dayton Power & Light Company of Dayton, Ohio.

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BERNARD KORBLY, Indianapolis, a director of the Indianapolis Power & Light Company since 1929, has been elected vice-president and general counsel by the board of directors. Mr. Korbly assumed the duties relinquished by CHARLES N. THOMPSON, who retired after a long period of service.

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F. J. GRIFFITHS has been elected director and president of the Timken Steel & Tube Company, with offices in Canton, Ohio. M. T. LOTHROP, president of the Timken Roller Bearing Company, has been made chairman of the board of the Timken Steel & Tube Company. Mr. Griffiths goes to the Timken company with broad experience and a thorough understanding of the present problems of the steel industry, with which he has been prominently identified for 30 years. Until recently he was associated with the Republic Steel Corporation in the capacity of president of the Republic Research Corporation. Mr. Griffiths began his career in the steel industry with the United Steel Company at Canton and later helped to organize the Central Steel Company in Massillon, Ohio, of which he was president and general manager. When these two companies were merged to form the Central Alloy Steel Company, he was chosen chairman of the board, which office he held until the Central Alloy merger with Republic.

W. W. Nielsen Heads Rocky Mountain Division. N.E.L.A.

WILLIAM W. NIELSEN, who was elected president of the Rocky Mountain Division of the National Electric Light Association, as announced recently in the ELECTRICAL WORLD, is manager of the New Mexico Power Company at Santa Fe.

Born in Copenhagen, Denmark, Mr. Nielsen at an early age came to America and received his early education in the public schools of Hartford, Conn., and

at Phillips Andover Academy. His bachelor of science degree was conferred by Colgate University. Returning from military service in France, he entered the employ of the Federal Light & Traction Company as assistant to the general manager at Springfield, Mo. In 1924 he went to Tucson as assistant manager of that property, and two years later he was sent to manage the New Mexico Power Company, with headquarters at Santa Fe.

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KENNETH CURTIS, son of August D. Curtis, who died April 29, has been made president of the Curtis Lighting Inc., Chicago. Mr. Curtis has been deeply interested in the subject of lighting since the time when, at the age of fourteen, he assisted his father in the first demonstration of "Indirect Lighting" before the Illuminating Engineering Society in 1908. His educational background is unusually diversified, embracing attendance at the University of Wisconsin, where he majored in geology, and at the University of Chicago on research work in the Rockies both for the University of Chicago and for the United States Geological Survey. Recognizing that geology, absorbing as it might be for an avocation, had little to do with the manufacturing business, he attended the Night Commerce School of Northwestern University and after five years of hard work, both at the factory and at night school, won his degree of master of business administration. He has traveled extensively in this country and in the Orient, Alaska and South America. Besides being head of Curtis Lighting, Inc., and president of seven other companies ranging all the way from securities to insurance, Mr. Curtis is at present devoting much energy to the operation of sixteen trusts which he heads. He is a director of the Electric Association of Chicago, a donor and member of the Illuminating Engineering Society and a member of the National Electric Light Association.

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HARRY W. HALE, who for the past seven years has been connected with the merchandise department of the Narragansett Electric Company at Providence, R. I., is now merchandise manager of the Fall River Electric Light Company, Fall River, Mass.

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CHARLES N. THOMPSON, vice-president and general counsel of the Indianapolis Power & Light Company, Indianapolis, Ind., has resigned. He has been a director and chief counsel of the company since 1913 and a vice-president since 1924. A graduate of De Pauw University. Mr. Thompson is widely known as an attorney and in the course of his career has been identified with many of the outstanding financial institutions in Indianapolis.

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OBITUARY

ANDREW J. WILEY of Boise, Idaho, consultant for the Hoover Dam project and the Colorado River aqueduct project of the Metropolitan Water District of Southern California, died October 8 at Monrovia, Calif., in his seventieth year. Mr. Wiley was identified with many large engineering projects both in the United States and abroad. His first work following graduation from Delaware College in 1882 was with the Idaho Mining & Irrigation Company in the construction of an irrigation system. He later was the engineer for a number of power projects in Idaho and Wyoming. He designed the Don Pedro Dam and irrigation system for Turlock and Modesto, Calif., and was consulting engineer for a number of other water and power projects in central California. He was consulting engineer for the British government in India in 1927.

Financial and Statistical News

PUBLIC utility bonds, having lagged behind stocks in the upward movement following Washington relief announcements, were slower to react downward early this week following the tightening of money rates. New bond financing has been virtually negligible, both in the utility field and elsewhere. Sale of preferred stock to customers, however, continues well up to average, especially in the Middle West and Pacific Coast areas.

——UTILITY COMMON STOCKS RECOVERED SUBSTANTIALLY late last week before renewed selling commenced. Average of 37 holding and operating company stocks rose 3 points from the year's low to 44.5, still 30 points below the year's high.

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Output Off 3 per Cent

ENERGY OUTPUT by public utilities in August, it is reported by the Geological Survey, was 7,628,556,000 kw.-hr., 3 per cent less than the output a year ago and nearly 2 per cent less than in July. Water power contributed 2,464,630,000 kw.-hr., 32 per cent of the total.

Production by the use of water power continues to decrease, owing to the usual seasonal decrease in the flow of streams used for hydro generation, at about the same rate as last year, and in addition it is affected by drought in different sections of the country.

Regional changes compared with 1930 appear in the accompanying table. For the sixth consecutive month the output in New England is above last year's.

Regional Output in August and July Compared with 1930

Region	Per Cent Change from Previous Year July	August
New England	+4	+4
Middle Atlantic	—1	—3
East North Central	—4	—5
West North Central	—1	—5
South Atlantic	+2	+3
East South Central	0	+3
West South Central	—10	—13
Mountain	—13	—16
Pacific	+1	—3
United States	—2	—3

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Utility Securities Added to State Legal List

BOND ISSUES OF THREE electric light and power companies have been added to the list of securities held legal for savings banks investments, Joseph Broderick, New York State Superintendent of Banks, has announced. They include the following: Pennsylvania Electric Company, first and refunding 4s, 1961, series G; West Penn Power Company, first 4s, 1961, series H, and Wisconsin Power & Light Company, first lien and refunding 5s, 1961, series G.

General 7s, 1946, series B, of the Rochester Gas & Electric Corporation have been removed from the list, having been called for redemption, September 1, 1931.

Small Commercial Use Increases

USE OF ELECTRICITY by small commercial concerns, stores, theaters, institutions and similar places show an increase for the first half of this year of 1.2 per cent compared with 1930 and 9.2 compared with 1929, it is revealed by an N.E.L.A. analysis of power company returns. On the other hand, large industrial and mining enterprises consumed 10 per cent less power in the six months ended June 30 than they did in the corresponding period of 1930.

Taking all sales for all purposes together, the use of electricity in the United States for the first half of this year was 4.3 per cent below the figure for the same period in 1930, but only 1.4 per cent less than in 1929, when industrial activity was at an exceptionally high level.

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Utilities Not Responsible for Market Gyrations

ALTERNATE perpendicular advances and sharp declines in utility bond as well as stock prices of late would normally suggest happenings of major importance in the industry. The buyer of high-grade bonds and preferred stocks buys these issues to secure stability and usually he gets a highly stable form of investment.

But lately bond and preferred stock prices have shown anything but stability. Weekly fluctuations have recently exceeded those of a six- and even a twelve-month period, in normal times. Daily fluctuations of preferred stocks have exceeded those of the corresponding common stocks. Wide price changes have occurred on a relatively limited turnover.

In the case of bonds the holding company issues have suffered most. The 1931 high and low prices of standard issues frequently show a range of 15 to 20 points.

In the case of preferred stocks the following group of New York Curb stocks illustrates the range of these issues this year to date:

	High	Low
Alabama Power, $6 pref	103	94
American Gas & Electric pref	111	86
American Superpower 1st pref	99	65
Cities Service Power & Light, $6	82	57
Electric Bond & Share, $6	108	75
Nat. Public Service, 7%	87	50

But a study of the utility situation discloses no sharp decline in earnings and no major adverse factors on the horizon. Earnings have fallen off only a few per cent on the average and industry leaders anticipate a steady growth in earnings, with reviving business more or less comparable to the growth of the past few years. It is obviously the holder of securities and the market that must be held responsible for these gyrations rather than anything in the utility picture itself. Indiscriminate dumping of these securities by frightened holders would naturally break a market such as the present one and it is needless to seek any further cause. Some holders have a tendency to criticise investment houses for not lending support to their issues. It is fairly evident that in a panicky period, such as that of recent weeks, market support would mean buying back some of these issues virtually *in toto*.

The other side of the picture is seen in the vigorous rallies which followed President Hoover's pool announcement. Such sharp recoveries would certainly not occur if the investing public anticipated any serious menace to the future growth of the industry.

While these observations relative to the responsibility for sharp market

breaks and consequent losses to shareholders are elementary to those familiar with the subject, it is not inconceivable that political attempts may be made to saddle the responsibility upon the utilities themselves.

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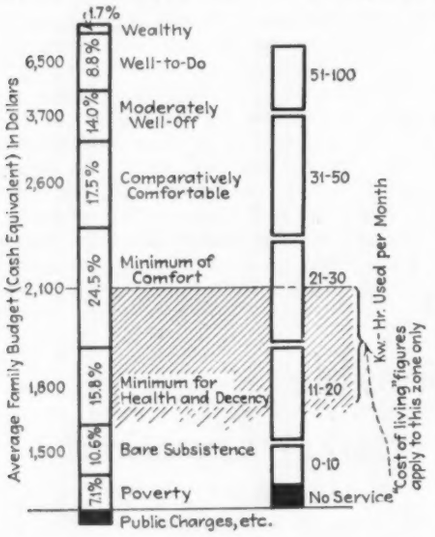
One per Cent for Electricity

How does the consumption of electrical energy vary with the family income? Is there a definite relationship between the two? There seems to be, according to a study reported in the N.E.L.A. *Bulletin*.

The net results are summarized in the chart here reproduced. In the light of



Approximate comparison between family income and use of domestic electric service

present information only broad generalizations are possible, and even they are subject to various qualifications and exceptions, some of which are mentioned in the article.

The right-hand column represents the distribution of electric customers by their annual consumption of energy, each block being proportionate in size to the number of customers in the designated energy group. The little gaps allow for exceptions, wherein families in the two columns do not correspond.

The left-hand column represents the proportionate distribution of families in terms of income. As a rough approximation, it is assumed that the income groups in the service areas of the United States are similar to those of the country as a whole and that the groupings represented in the two columns of the chart are comparable.

If the average bill paid per year for domestic service is computed for each of the blocks shown, it will be found to be almost exactly 1 per cent of the total family budget shown for the group, whether that income be large or small.

International Development Can Provide 6,500,000 Hp.

Development of 4,000,000 hp. is possible on the St. Lawrence River and an additional 2,500,000 at Niagara without detracting from the scenic grandeur of the latter, it is stated in a pamphlet entitled "Study of the St. Lawrence Waterway Project," by S. S. Wyer, published by the Fuel-Power-Transportation Educational Foundation, Columbus, Ohio. Quoting from various official publications, a condensed analysis is given of proposed methods for utilizing the Great Lakes, the St. Lawrence and, alternatively, the Hudson River, for deep-water navigation combined with power development. The steadiness of flow of several well-known developments is compared, as follows:

Stream	Flow in Thousand Cu.Ft. per Second Min.	Max.	Ave.
St. Lawrence	174	318	246
Tennessee at Muscle Shoals	9	481	...
Susquehanna at Harrisburg	6	344	44

The proposed Lake Ontario-Hudson route is thus contrasted with the St. Lawrence route:

	St. Lawrence	Ontario-Hudson
Duluth to Liverpool, miles	4,544	5,173
Duluth to Liverpool, time	17 d., 12 hr.	18 to 20
Number of locks, Ontario to sea	7 to 9	18 to 20
Number of bridges, Ontario to sea	8	54
Miles restricted way, Ontario to sea	21 to 25	128
Estimated cost, millions of dollars*	394	506
Length of closed season, about	5 mo.	5 mo.

*Excluding certain items common to both routes.

The initial development program of the St. Lawrence is stated to embrace 2,730,000 hp., 2,326,000 hp. of it on the international section and 404,000 on the Soulanges section, the latter being already in process at Beauharnois. Later full development would increase this to 5,000,000 hp., 4,000,000 hp. of it continuously available, at a total ultimate cost, including navigation works, of $620,000,000 to $650,000,000.

The increase of 2,500,000 hp. at Niagara is computed on the assumption that control works will give a sheet of water over the Horseshoe equal to that on the American Falls, with reduced erosion in the notch of the former, and that adequate flow will be provided for sluicing away the ice.

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NEWS BRIEFS

Associated Gas & Electric Company has declared the regular stock dividend on the class A stock, but has omitted cash option.

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Increases of 11.9 per cent in residential lighting sales and 4.2 per cent in commercial power sales were made by subsidiaries of the Central and South West Utilities Company in July, 1931, over the corresponding period in 1930, according to a report issued by James C. Kennedy, president of the company.

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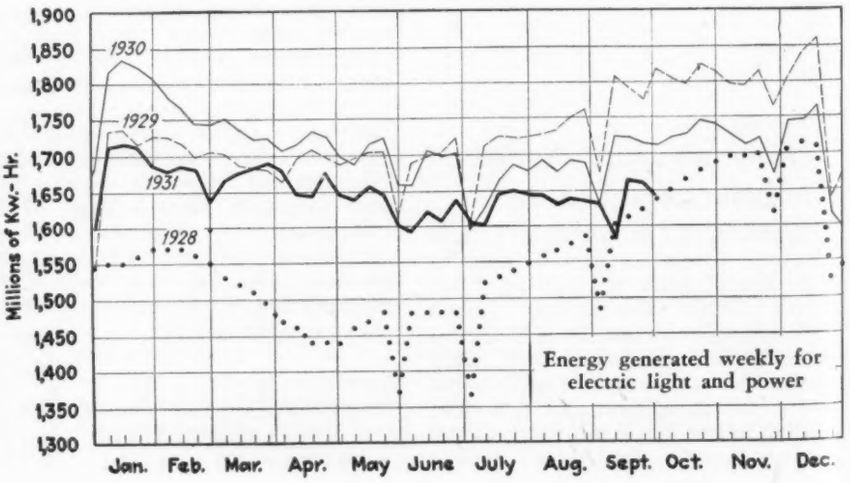
Weekly Energy Output

Output of electric light and power plants has been on a slightly higher level since Labor Day than it was during the month before that holiday, but compared with the two preceding years it continues abnormally low. For the week ended October 10 it fell short of last year's production by 4.1 per cent.

Comparative weekly figures, as announced by the National Electric Light Association, follow:

	1931	1930	1929	1928
September 5	1,636	1,630	1,675	1,484
September 12	1,582	1,727	1,806	1,604
September 19	1,663	1,722	1,792	1,614
September 26	1,660	1,714	1,778	1,623
October 3	1,646	1,711	1,819	1,637
October 10	1,653	1,724	1,806	1,651

Regional comparisons reveal no significant changes. For the week ended October 3 the Atlantic seaboard was down 0.5 per cent from last year, the central industrial region 7.5, the Chicago district (separately) 5.1 per cent, the Pacific Coast 2.4 per cent.



Industry Increases 3 per Cent

RISING 3 per cent from August operations, manufacturing activity in September moved parallel to last year's change at the same season, and thus continued about 9 per cent below the 1930 rate. When the index for each industry is adjusted for seasonal variations the rise in the average is less than normal, so that the adjusted figure for September is 3 per cent below that for August. But in this connection it must be remembered that what was a normal variation some years ago may no longer be normal, in view of changed conditions. The fact of an actual rise remains.

As was to be expected from reports of increased employment in automobile plants, this industry enjoyed a decided rise; the returns show an increase of 23 per cent. [On the chart below the September point should be at 53.7.] It is still 39 per cent below its rate of activity a year ago.

The metal industries continue about as in August, and therefore much lower than last year; rubber decreased and is down 18 per cent from 1930. It will be noted that this industry has maintained itself closer to the level of previous years than has the automobile industry, with which it is closely associated.

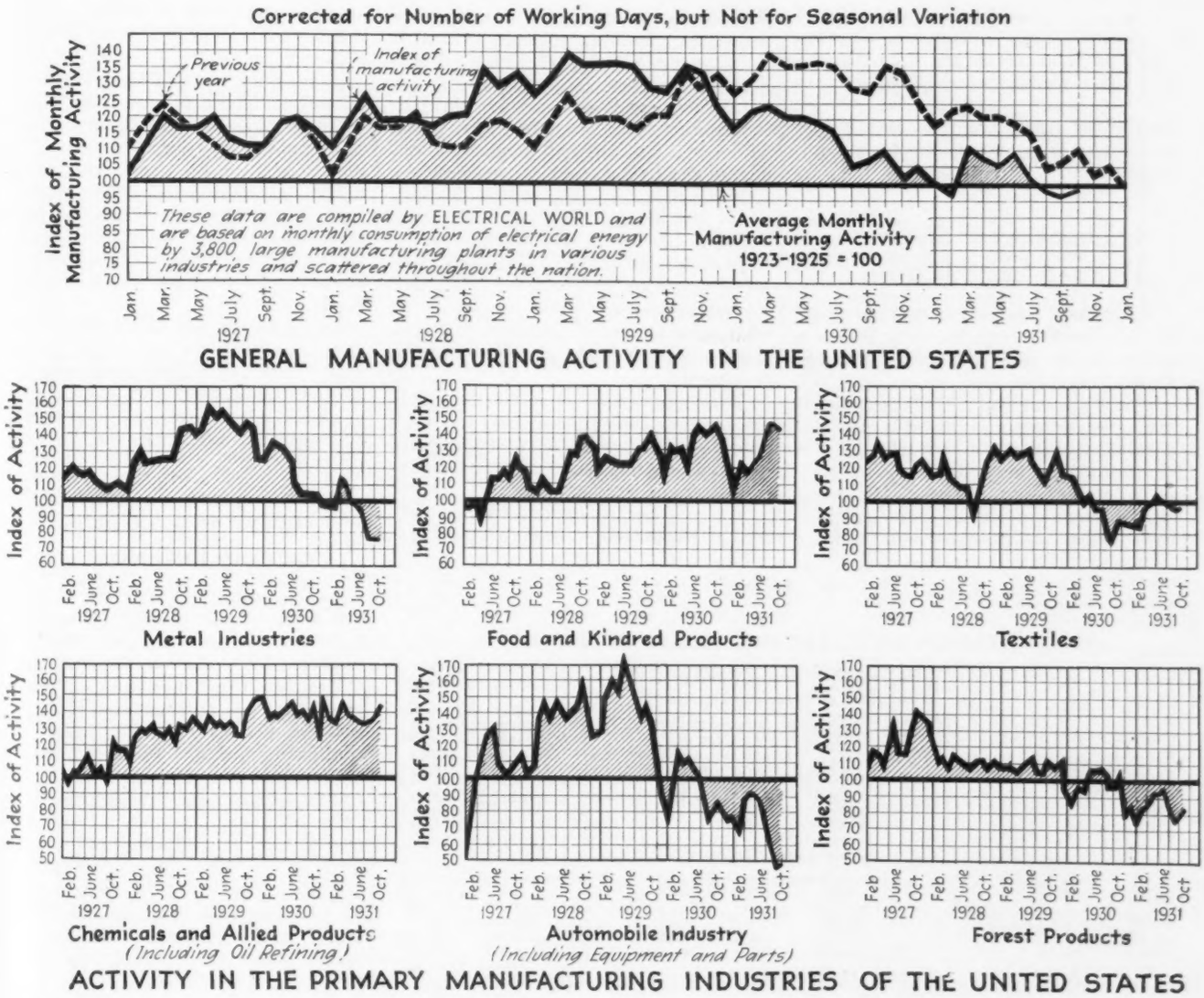
The better position of such "consumer products" industries as textiles and leather goods continues; the former is up 15 per cent from September, 1930, and the latter 11 per cent. The food industries are running close to the level of their peak year, 1930. The stone-clay-glass group, in which cement manufacture is prominent, gained nearly 8 per cent and is only 5 per cent lower than at this time last year; forest products rose 4 per cent, but is 22 per cent under 1930.

Industrial activity as here analyzed is based on electrical energy consumption in representative manufacturing establishments throughout the country.

Index of Manufacturing Activity

Base: Average Month, 1923-25

Industrial Groups	Sept. 1931	August, 1931	July, 1931	June, 1931	August, 1930	Sept. 1930
All Industry	**100.4**	**97.3**	**97.9**	**101.7**	**106.3**	**110.7**
Automobiles (including parts and accessories)	53.7	43.6	55.9	71.3	86.6	88.4
Chemical products (including oil refining)	144.6	137.6	137.7	132.7	135.7	147.1
Food products	142.0	146.4	147.0	136.2	141.2	148.6
Iron and steel	78.3	78.0	83.1	86.6	112.0	110.3
Metal working	75.0	73.3	69.3	78.6	95.2	97.4
Leather products	81.9	77.1	83.8	85.4	87.7	73.5
Forest products	82.2	79.4	76.9	86.3	97.7	105.6
Paper and pulp	138.3	121.7	104.0	112.4	115.1	119.3
Rubber products	88.0	98.5	97.4	121.0	110.5	107.2
Shipbuilding	88.9	85.6	82.0	84.8	122.8	124.1
Stone, clay and glass	113.9	105.9	104.8	118.7	118.2	120.5
Textiles	98.7	95.0	98.2	100.5	72.5	85.1


Corrected for Number of Working Days, but Not for Seasonal Variation
Index of Monthly Manufacturing Activity
Previous year
Index of manufacturing activity
These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,800 large manufacturing plants in various industries and scattered throughout the nation.
Average Monthly Manufacturing Activity 1923-1925 = 100
GENERAL MANUFACTURING ACTIVITY IN THE UNITED STATES
Index of Activity
Metal Industries
Food and Kindred Products
Textiles
Chemicals and Allied Products (Including Oil Refining)
Automobile Industry (Including Equipment and Parts)
Forest Products
ACTIVITY IN THE PRIMARY MANUFACTURING INDUSTRIES OF THE UNITED STATES

Business News and Markets

Refrigeration Campaign Bureau Makes Progress

REGARDING THE ACHIEVEMENT so far of the Refrigeration Campaign Bureau Chairman J. E. Davidson states that it has increased the amount of advertising and activity on electric refrigeration during 1931, has increased public interest in electric refrigeration and has inspired sales organizations. As a result of these contributions sales have increased, he says.

The Electric Refrigeration Bureau, through its co-operative advertising and merchandising calling together all those interested in electric refrigeration, has developed a better understanding among these groups and has contributed greatly to the building up of good will.

The advertising of the bureau has increased the value of product advertising, and it is developing an organization and a method which promise much for the future. Communities to the number of 8,500 are now taking part in this activity, according to the announcement.

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Equipment for British Railroad Electrification

FOUR OF THE LEADING British electrical manufacturing concerns have been approached by the Central Electricity Board for their view on the question whether the industry will be able to meet the enormous demands for apparatus which would be made if the electrification of main-line railroads were carried out. These and other British electrical concerns have already been called on to carry out railroad electrification work on a large scale in various parts of the world.

The view held by all four companies is that the facilities available for the full electrical equipment of Britain's railroads are far in excess of any demand which has already arisen, and a scheme of electrification, spread over fifteen years, could be carried out easily.

It is announced that the national grid for the supply of electrical energy and lighting throughout the United Kingdom will be complete in about two years. The Central Electricity Board, under complete railway electrification, would require about $400,000,000 new capital for new transmission lines and the building and equipment of new substations. No difficulty is anticipated in raising the necessary capital, according to those familiar with the situation.

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Active Program Under Way on Insulating Materials

AN UNUSUALLY full program of activities for the coming year is planned by the committee on electrical insulating materials of the American Society for Testing Materials, Chairman H. L. Curtis announces.

Insulation resistance of varnish films, for example, will be studied intensively. There is a feeling that even conditions during the baking period determine the later performance of varnish films in tests for drying time and dielectric strength.

The sub-committee on molded insulating materials is developing a standard purchase specification for phenol plastic molding compounds. A study of impact fatigue of molded plastics will be continued.

The subcommittee on plates, tubes and rods is already working on such subjects as compressibility of laminated materials, testing for tensile and dielectric strength, etc.

Study of electrometric titration methods of determining neutralization in a number of oils has been undertaken by the liquids insulation committee. Two methods have been developed which, it is felt, can be used with a fair degree of accuracy.

A study of types of electrodes to use in measuring the resistivity of solid insulating materials will be made by the subcommittee on electrical tests. Also the preparation of a method for measuring the power factor of dielectrics at 1,000 cycles per second will be undertaken as well as a study of methods of measuring dielectric constant and power factor at frequencies above 10 megacycles.

Natural mica will be studied to determine methods for grading, measurement of thickness and power factor, and a study of pasted mica to determine hardness, edge hardness and percentage of binder will be undertaken.

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DELINQUENT ELECTRICAL ACCOUNTS

National Electrical Credit Association)

Number of Accounts Reported

Division	August 1930	August 1931	Per Cent Inc. or Dec.	Eight Months 1930	Eight Months 1931	Per Cent Inc. or Dec.
New York	251	145	—42	2,427	1,935	—18.2
Middle and Southern Atlantic	143	106	—25.9	1,333	982	—26.3
New England	102	78	—23.5	990	741	—25.1
Central	659	451	—31.6	6,031	4,617	—23.4
Total	1,155	780	—32.5	10,781	8,325	—22.8

Total Amounts Reported

Division	August 1930	August 1931	Per Cent Inc. or Dec.	Eight Months 1930	Eight Months 1931	Per Cent Inc. or Dec.
New York	$23,885	$16,147	—32.3	$399,480	$258,927	—35.2
Middle and Southern Atlantic	28,514	15,231	—46.6	214,263	126,916	—40.8
New England	7,141	4,655	—34.8	138,654	64,192	—53.7
Central	63,059	34,628	—45.0	797,195	416,053	—47.5
Total	$122,579	$70,681	—42.4	$1,549,622	$868,093	—44.0

Pennsylvania Orders Porcelain Insulators

A LARGE ORDER for porcelain insulators has been placed by the Pennsylvania Railroad management with the Westinghouse Electric & Manufacturing Company. These insulators will be used to suspend the high-tension lines for the new electrification work now being continued toward Washington from Wilmington.

The transmission system for which these insulators are ordered is said to exceed in magnitude any previous undertakings for railroad operation in the world and uses the high pressure of 132,000 volts to carry the electric power to the various substations, from which points it is fed to the electric locomotives on the train.

General Electric Orders Down 24.2 per Cent

ORDERS RECEIVED BY THE General Electric Company for the first nine months of 1931 amounted to $202,700,016, compared with $267,651,832 for the corresponding period last year, Gerard Swope, president of the company, announced. This is a 24.2 per cent decline.

Sales billed for the nine months of 1931 amounted to $206,138,967, compared with $287,886,541 for the corresponding period last year. Profit available for dividends on common stock for the first nine months of 1931 was $30,753,850, compared with $42,518,708 for the first nine months last year.

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TRADE BRIEFS

The National Electric Light Association has published a booklet on "Experimental Developments in Wiring."

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Latest developments in its line of electric flow meters operating on the inductance-bridge principle are discussed by the Brown Instrument Company in Flow Meter Catalog 2002.

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Charles H. Bauer has been appointed general sales manager of L. H. Gilmer Company, Tacony, Philadelphia.

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Electric Household Utility Corporation has omitted the quarterly dividend due recently.

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Net earnings of the Diamond Electrical Manufacturing Company, Ltd., for the six months ended June 30 amounted to $36,720, as compared with $58,100 for the similar period of 1930. Current assets at July 16 totaled $419,563, of which $109,046 was cash and marketable securities, while current liabilities were $19,993. Earned surplus on July 16 last, after payment of the second quarter dividends, totaled $175,937, as compared with $148,633 on June 30, 1930.

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The Jefferson Electric Company, Chicago, has awarded the contract for the construction of a new $550,000 plant to the Austin Company, engineer and builder of Cleveland.

New York Metal Prices Show Little Change

	Oct. 7, 1931 Cents per Pound	Oct. 14, 1931 Cents per Pound
Copper, electrolytic	7	7
Lead, Am. S. & R. price	4	4
Antimony	6.55	6.50
Nickel, ingot	35	35
Zinc, spot	4	3.75
Tin, Straits	23⅛	23.35
Aluminum, 99 per cent.	23.30	23.30

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Electrical Exports Off 30 per Cent

AUGUST EXPORT FIGURES show further evidence of the effect of business depression abroad. Sales of electrical equipment declined 25 per cent from the previous August, and totals for the eight months ended August 31 were down approximately 30 per cent from the figure for the same period last year. Switches, transformers, motors and central-station equipment in general showed sharp reductions.

Details of equipment exports by items are shown in the accompanying table.

Exports of Electrical Equipment (Preliminary)

Article	August 1930	August 1931
Generators:		
Direct-current—		
Under 500 kw.	$74,055	$6,340
500 kw. and over	12,142	21,990
Alternating-current—		
Under 2,000 kva.	10,077	17,777
2,000 kva. and over	32,033	305,973
Steam turbo-generator sets	45,422	1,277
Accessories and parts for generators	46,893	110,440
Arc welding sets	38,999	20,785
Self-contained lighting outfits	94,301	17,649
Batteries:		
6-volt storage batteries	152,461	150,265
Other storage batteries	66,503	39,328
No. 6 dry cell batteries	22,359	26,051
Flashlight batteries	245,278	250,761
Radio B and C batteries (dry)	43,133	19,443
Other dry and wet cell primary batteries	13,741	6,097
Transforming or converting apparatus:		
Power transformers, 500 kva. and over	49,672	17,481
Distribution transformers, less than 500 kva.	137,908	31,030
Instrument transformers	15,112	15,728
Other transformers	88,669	39,632
Complete battery chargers under 15 amp.	12,353	2,724
Double-current and motor generators, dynamotors, synchronous and other converters	58,892	116,372
Transmission and distribution apparatus:		
Switchboard panels, except telephone	150,498	32,587
Power switches and circuit breakers over 10 amp.	187,277	46,511
Fuses	29,724	13,203
Watt-hour and other measuring meters	58,998	53,569
Electrical indicating instruments	71,546	54,219
Electrical recording instruments	28,175	30,658
Other electrical testing apparatus	71,637	58,157
Lightning arresters, choke coils, reactors and parts	78,963	38,892
Motors, starters and controllers:		
Motors, ½ hp. and under	236,231	89,142
Motors, over ½ hp. and under 1 hp.	58,393	25,136
Stationary motors—		
1 to 200 hp.	$209,714	$97,992
Over 200 hp.	87,323	1,035
Railway motors	.....	.....
Electric locomotives—		
Railway	.....	.....
Mining and industrial	22,225	13,624
Station and warehouse electric motor trucks	20,837	6,000
Starting and controlling equipment—		
For industrial motors	132,434	91,206
For electric railway and vehicle motors	8,311	18,894
Portable electric tools	102,878	42,367
Accessories and parts for motors	162,311	122,357
Electric refrigerators and parts:		
Household	581,980	378,636
Commercial up to 1 ton	136,619	60,949
Parts for electric refrigerators	.....	213,835
Electric appliances:		
Electric fans	102,869	26,914
Electromechanical health exercisers	9,025	2,707
Electric incandescent light bulbs—		
For automobiles, flashlights and Christmas trees	20,915	17,219
Other metal-filament bulbs	51,857	30,886
Other electric lamp bulbs	23,009	9,412
Flashlight cases	88,373	40,628
Searchlights and floodlights	26,852	16,572
Electric household washing machines	111,106	63,476
Electric domestic vacuum cleaners	180,777	51,146
Other domestic motor-driven devices, except tools	53,890	24,567
Electric flatirons	20,100	14,700
Electric cooking ranges	50,067	23,947
Other domestic heating and cooking devices	78,913	39,568
Industrial electric furnaces, ovens and other heating devices	31,651	68,992
Therapeutic and X-ray apparatus	127,545	99,649
Signal and communication devices:		
Radio apparatus—		
Transmitting sets, tubes and parts	48,435	141,467
Receiving sets	$904,967	$1,411,981
Radio receiving tubes	237,475	157,036
Receiving-set components	418,995	399,873
Loud speakers	142,047	112,212
Other receiving-set accessories	122452	28,393
Telegraph apparatus	77,182	14,007
Telephone apparatus—		
Telephone instruments	23,981	16,785
Telephone switchboards	55,168	5,683
Other telephone equipment	325,693	73,540
Bells, buzzers, annunciators and alarms	21,792	27,018
Other electric apparatus:		
Spark plugs	91,491	143,136
Other starting, lighting and ignition equipment	97,190	46,694
Insulating material	77,676	43,707
Metal conduit, outlet and switch boxes	85,297	33,628
Sockets, outlets, fuse blocks and lighting switches	133,830	98,696
Electric interior lighting fixtures	157,645	86,010
Electric street lighting fixtures	33,638	17,019
Other wiring supplies and line material	141,849	92,168
Other electrical apparatus, n.e.s.	765,563	392,395
Rubber and friction tape	34,650	21,249
Globes and shades for lighting fixtures	36,876	23,631
Glass electric insulators	9,553	5,278
Electrical porcelain:		
For less than 6,600 volts	43,187	20,602
For 6,600 volts and over	37,626	129,796
Carbons and electrodes:		
Electrodes for electric furnaces	161,671	16,,237
Other carbon products	50,470	38,405
Insulated iron or steel wire and cable	10,109	12,403
Copper, bare wire	191,442	56,442
Insulated copper wire and cable:		
Rubber-covered wire	54,763	29,394
Weatherproof wire	31,517	14,593
Telephone cable	23,092	5,354
Other insulated copper wire	222,270	152,648
Nickel-chrome electric resistance wire	125,860	20,163
Totals	$9,668,478	$7,269,138
Eight months ended Aug. 31	$91,675,760	$64,860,990

Market Conditions

NEW orders of substantial size are exceedingly rare in the equipment field this week. Day-to-day business is satisfactory, but certainly not outstanding. Holiday buying is said to be on a very cautious basis on the Pacific Coast and elsewhere. The week's totals indicate seasonal slackness in most sections of the country.

——EARLY ACTIVITY IS INDICATED BY THE WEEK'S BUSINESS and events in the Eastern district, especially a greater tendency to place actual orders. Central-station business is slow in materializing.

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EASTERN

—INDICATIONS POINT *to early market expansion for electrical equipment in the Eastern district. Present volume sales show improvement over transactions of a few weeks ago and there is noticeably more intention of placing commitments. Prices and keen bidding for business are important features of the current trend, just as they are likely to be for some time to come.*

—CENTRAL-STATION ACCOUNT *is decidedly more prospective than immediate, but that orders are definitely on the way is shown by some worth-while inquiries from that quarter; industrial business carries like tendencies. Meantime, traction demand is developing, municipalities are purchasing and specialty business is expanding, with government account still an attractive center of interest.*

The Moore Steam Turbine Corporation has secured an order from the Navy Department for a 750-kw. turbo-generator unit for the Portsmouth, N. H., yard at a price of $23,460. A New York manufacturer will furnish transformers, switchgear, motors and accessory equipment for a sewage station installation in northern New Jersey, the contract totaling $60,000. Fairbanks, Morse & Company has recently closed for three 800-hp. Diesel engine-generating sets and two 500-hp. motors for a flour mill installation in Minneapolis, Minn., aggregating $190,000.

An important contract has been obtained by the Consolidated Gas, Electric Light & Power Company, Baltimore, from the Pennsylvania Railroad Company, covering power requirements for its electrified line from the Susquehanna River crossing at Havre de Grace, Md., through Baltimore to Washington, D. C., work on which is now under way. The agreement extends for twenty years, dating from 1933, when the line will be ready; the power bill is estimated at $4,000,000 annually; transmission and feeder lines, substations and other structures will be constructed to carry out the contract. The Long Island Railroad Company, New York, contemplates the electrification of its Stewart division between Brooklyn and Babylon, L. I., estimated to cost several million dollars. General Electric Company has secured a contract for motors, controls and accessories for 22 electric trolley buses for Wisconsin Gas & Electric Company.

A government contract for marine lighting and wiring equipment has been placed with Lovell-Dressel Company, Arlington, N. J., and production will be increased to a full-time schedule at once at the plant. The A.A. Electric Company, Cicero, Ill., has tendered a low bid for an ornamental street-lighting installation at Evanston, Ill., at $1,093,863, and is expected to receive award.

CONSTRUCTION PROJECTS

Hecker-H-O Company, Buffalo, N. Y., plans addition to flour and cereal mills to cost about $1,000,000. United States Engineer Office, Buffalo, N. Y., will receive bids until October 21 for two complete Diesel engines, direct reversible, and for one 15-kw. generating set and auxiliary equipment. Signal Supply Officer, Signal Corps, United States Army, Army Base, Brooklyn, N. Y., will receive bids until October 30 for reel carts in lots of 100 to 500 (Circular 37). Philadelphia Electric Company, Philadelphia, Pa., has plans for frequency converter susbtation to cost $217,000, of which over $175,000 will be expended for equipment; company will carry out expansion program for central steam heating service to cost more than $3,500,000. Department of City Transit, Philadelphia, Pa., will receive bids until October 27 for station control equipment. Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until October 20 for 15,000 ft. of insulated electric cable for Brooklyn, N. Y., navy yard (Schedule 6716); until October 27 for 600 12-volt storage batteries for Philadelphia, Pa., yard (Schedule 6690); until October 27 for one electrical test bench for San Diego, Calif., yard (Schedule 6693). Bureau of Yards and Docks, Navy Department, Washington, D. C., will receive bids until October 21 for structural steel beacon tower with beacon and floodlights at aviation base at Opa Locka, Miami, Fla.

MIDDLE WEST

—VERY LITTLE CHANGE *in general business has been observed this week in this section. While the volume remains practically level, there has been little indication of any definite seasonal improvement.*

—ENCOURAGING REPORTS *of greater activity are being heard here and there, but general business is doing little more than to maintain its present rate of production. The recent Hoover financial plan is creating considerable optimism and indications seem to point to a slow return of confidence.*

Some improvement is observed in the automotive industry, with a larger amount of commitments for steel shapes and sheets. Some of the railroads are again buying rails, although rail buying is likely to be delayed until the pending freight rate case is decided. An interesting inquiry is out for 170 piles of 20-in. gas pipe. Central carloadings are holding up fairly well, one carrier reporting a definite increase in the number of revenue cars being handled. Wholesale business continues steady with a considerably improved and more optimistic outlook noted.

The interesting contracts placed this week were one for the construction of a substation to cost $325,000 and one for the installation of a heating and ventilating system to cost $35,000.

CONSTRUCTION PROJECTS

Ypsilanti State Hospital, Ypsilanti, Mich., plans new addition to cost $400,000. Richter Food Products Company, Chicago, Ill., has filed plans for plant to cost $475,000. Transamerican Airlines Corporation, Chicago, Ill., has plans for mechanical and service building at local airport to cost $80,000. Richmond, Ind., has authorized fund of $400,000 for purchase of 15,000-kw. turbo-generator and other equipment for municipal power plant. Aeronautic Association, Youngstown, Ohio, plans airport lighting system. State Board of Administration, St. Paul, Minn., will receive bids until October 20 for generator, boilers, forced draft fans and other power equipment for generating station at state institution at Grafton, N. D.

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SOUTHWEST

—A VERY SLIGHT CHANGE *has been noted in conditions. Only one of the large manufacturers reported any improvement. Others said business was just holding to the level of last week.*

Utilities are still buying very cautiously and industrials only their immediate necessities. The only contracts reported closed were a lot of distribution transformers for a municipal plant

to cost $3,000 and six motors 5 hp. to 25 hp. for an Arkansas plant to cost $2,500.

CONSTRUCTION PROJECTS

Construction Quartermaster, United States Army, Fort Sill, Okla., will receive bids until October 30 for airplane hangars, shops, etc. Army and Navy General Hospital, Hot Springs National Park, Ark., plans hospital unit to cost $1,500,000, including power plant and other mechanical buildings. Hartman Interests, Inc., care of E. W. Hartman, Gulf Building, Houston, Texas, plans oil refining plant to cost about $2,000,000. Texas Power & Light Company, Dallas, Texas, plans ornamental lighting system at Temple, Texas.

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PACIFIC COAST

—ELECTRICAL BUSINESS *is decidedly spotty, some manufacturers reporting many special orders, while others report a very poor week. Wiring staple orders are perceptibly better, with several carloads of conduit and wire, together with carloads of hardware, crossarms and poles, one shipment consisting of 300 50-ft. 9-in. poles for the Northwest.*

—DEALERS ARE BUYING *very cautiously for the holidays. The opening steps in a fall lighting and holiday outdoor tree decorating campaign are being launched this month through ten selected cities.*

Street-lighting business, both contract and prospective, is especially good, including a $40,000 job for Pasadena covering 60 duplex standards, 40 duplex standards for south San Francisco, an order for $5,000 Westinghouse standards complete for San Jose and a prospective order for 254 combination trolley and duplex lighting standards for Glendale. A $2,000 floodlighting job for an amusement park in Belmont is reported. Other interesting orders cover a $10,000 Westinghouse elevator equipment for San Francisco. A $1,000 oscillograph for the university of Santa Clara, which has long specialized in such recordings and experiments; a 312-kva. waterwheel generator, exciter and switchboard valued at $6,000, and $15,000 worth of Westinghouse motor and control equipment for the motorized gravel plant at the Hoover dam site. Irrigation districts are particularly active, the Turlock irrigation district purchasing a $10,000 bank of large induction regulators and Madera planning a water distribution for which pumping motors and a power plant will be required in the near future. The outstanding item of interest for the week is the announcement that the 15,000-kva. steam plant at Herndon, in the San Joaquin Valley, will be under construction by the end of the year and is to be completed by June, 1933; approximately $1,500,000 worth of equipment will be purchased in the very near future.

An outstanding class of building seems to be hospitals, with the St. Joseph Academy at Altadena, the health center hospital in San Francisco, lighting fixtures for the San Joaquin Hospital at Stockton and a new wing for the San Mateo County Hospital among the projects.

The southern division of the Puget Sound Power & Light Company headquarters at Chehalis, Wash., announces immediate construction of 10½ miles of transmission line in southwest Thurston County to provide power and light for approximately 100 families, the improvement to cost about $11,000. Later a 3-mile line will be built between Oakville and Elma, it is stated. Installation of an ornamental street-lighting system on Fairview Avenue has been approved by the Seattle City Council and the Board of Public Works is expected to issue a call for bids for the work, estimated in excess of $26,000, soon. Sales of apparatus, transformers and miscellaneous switchgear in the Seattle district last week were neglible.

CONSTRUCTION PROJECTS

Los Angeles Gas & Electric Company, Los Angeles, Calif., plans addition to steam-electric generating plant at Seal Beach, with installation of 50,000-hp. turbo-generator unit, extensions in transmission lines and power substations, estimated cost $3,500,000. Turlock Irrigation District, Turlock, Calif., has plans maturing for power dam, to be known as Groveland Dam. and hydro-electric power plant, reported to cost over $700,000. William H. Wheeler, California Bank Building, San Diego, Calif., architect, is preparing plans for a hotel at Los Angeles, Calif., to cost $400,000. United States Engineer Office, Portland, Ore., will receive bids until October 26 for three indicating and recording meters (Circular 159).

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SOUTHEAST

—ELECTRICAL ACTIVITIES *in the Southeast showed some improvement last week due to evidence of industrials, principally textiles, taking advantage of the dull period to modernize their plants. Purchases by central stations, however, continue on a reduced basis.*

One company's orders for transformers last week amounted to $4,550 and it also ordered $3,500 worth of insulators and arresters. The Sewage and Water Board in New Orleans ordered synchronous motor equipment costing in excess of $20,000. An Atlanta contractor has been awarded contracts for nine small post office jobs which will call for approximately $7,500 worth of electrical materials. A restaurant in Tennessee ordered $6,000 worth of heavy-duty equipment and a wiring material order totaling $5,000 is in immediate prospect from this same source. A textile plant in North Carolina has let a contract for an addition to plant and has ordered $2,500 worth of electrical wiring and fixtures.

CONSTRUCTION PROJECTS

Virginia Electric & Power Company, Richmond, Va., will make extensions in ornamental street-lighting system at Norfolk, Va. Appalachian Electric Power Company, Roanoke, Va., has made application for permission to construct a transmission line over the Kanawha River, near Buffalo, W. Va. Construction Quartermaster, United States Army, Bowman Field, Ky., will receive bids until November 3 for construction of air corps double hangar, with shops, etc., for which an appropriation of $61,207 is available. Construction Quartermaster, United States Army, Fort Benning, Ga., will receive bids until October 29 for an underground electric distributing system.

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NEW ENGLAND

—UNEVEN TREND *in buying electrical equipment was reported in this district during the past week. Slight flurries in buying were reported, with small motor orders increasing slightly and inquiries for industrial equipment gaining.*

—SCHEDULED MATERIALS *are steady with small switch and control orders indicating a slight upturn. Heavy machinery interest is lagging and central-station supplies are confined to small orders of line materials for service extensions and new crossing locations.*

One prominent manufacturer reports an increase in arc-welding apparatus demand and notes several orders pending. Another prominent central-station official records negotiations in progress for several interesting electric cooking range sales. Encouragement for later orders is noted due to betterment in industrial conditions. One prominent New England power company reports an increase in power output amounting to about 11 per cent for the past month as compared with a corresponding month a year ago. One large nationally known electric clock manufacturer reports the necessity for a full force to meet orders for his product.

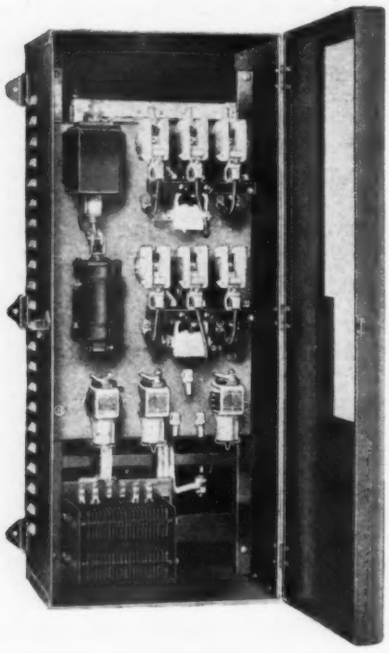
CONSTRUCTION PROJECTS

Construction Service, Veterans' Administration, Washington, D. C., has plans for new buildings at Veterans' Hospital, Rutland, Vt., to cost $410,000. New England Terminal Company, Quincy, Mass., plans oil storage and distributing plant to cost $1,500,000, on 74-acre site on Neponset River. Boston Elevated Railway Company, Boston, Mass., has filed plans for bus terminal at Medford, Mass., to cost over $125,000.

New Equipment Available

Automatic Starter for Network Systems

A MOTOR STARTER known as the bulletin 742 automatic increment starter has been developed by the Allen-Bradley Company, Milwaukee, to permit the starting of large squirrel-cage motors without current surges or violent line disturbances. This starter fully meets the requirements of electric light and



power companies for starting motors on network systems.

The starter consists of a panel with switches, relays, compression-resistance solenoid and graphite compression resistors, completely inclosed by a ventilated cabinet with hinged door. The panel frame also carries a full-wave copper-oxide rectifier and transformer for furnishing a rectified current of proper voltage for the operation of the solenoid. Control can be had through push buttons, float switch, pressure switch, thermostat or other contact-making devices inserted in the pilot circuit to the operating coil of the starting switch.

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Code Wire Identification

A METHOD OF IDENTIFYING its various grades of code wire by means of colored rubber insulation has been announced by the General Electric Company. By means of this marking the grades of wire in an installation may be identified at any time for years after the wiring system is in use, it is claimed. The three grades will be marked with colored rubber insulation as follows: Code, black; intermediate, red; 30 per cent, green. Another feature of importance is tighter and closer braids with an improved weatherproof finish.

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Self-Starting Low-Speed Synchronous Motor

A SELF-STARTING, LOW-SPEED synchronous motor known as the Sauter time switch has been announced by R. W. Cramer & Company, New York. It is designed to operate at a certain speed in exact time with alternating-current frequency from the generating station so that any number of these time switches, used to control multiple street lighting, sign and store window lighting, off-peak water heating and other time-controlled circuits, are all turned on or off at precisely the same time. It can be furnished in 2-, 10-, 15- and 25-amp. capacities for 110/220 volts, the synchronous motor being for use on 110 volts, 60 cycles.

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AN ANNOUNCEMENT HAS BEEN MADE by the Trumbull Electric Manufacturing Company, Plainville, Conn., of an addition to its line known as the "Nofuze" load center. This appliance, which is for protecting the lighting, water heater or range circuits in the home, can be supplied in from two to eight circuits, flush or surface mounting, with either 15-, 20-, 25-, 35- or 50-amp. circuit breakers mounted therein.

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Oval Tubing and Cable for Under Plaster Extension

TWO ADDITIONS TO ITS LINE of wiring materials, oval tubing and oval BX cable, have been announced by the General Electric Company. Oval tubing is a thin-walled, rigid-metal raceway designed for under-plaster extension installations in walls and ceilings. It may be used in direct connection with rigid conduit by joining it to the conduit with one fitting.

The oval BX cable incorporates all the features of BX cable plus its oval shape, a factor which makes it adaptable for all exposed or surface wiring. Neat installations are assured because the oval cable nestles into the plaster without the need for channeling the walls and ceilings and fits snugly around corners and projections.

Both these new wiring devices are particularly suited for partition installation.

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Small Motors Have Refillable Commutator

A LINE OF SMALL direct-current motors built in sizes from ½ hp., 1,750 r.p.m. to 3 hp., 1,750 r.p.m. for constant or adjustable speed operation has been announced by the Reliance Electric & Engineering Company, Cleveland, O. They are provided with ball or sleeve bearings and may be had in either open, semi-inclosed or fully inclosed construction. A feature not usually found in such small motors is the refillable-type commutator. If the copper bars should become damaged or badly worn, they may be easily removed and replaced. Another unusual feature is the provision of two brushes per stud. This betters commutation and keeps these power units running longer and steadier with less attention.

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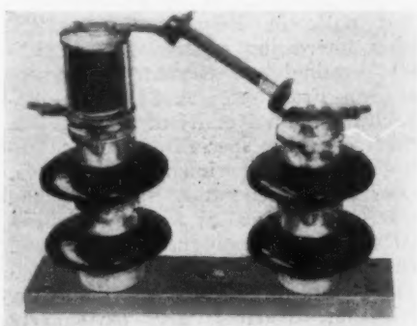
Special Fuse and Resistor Combinations

A NUMBER OF SPECIAL fuse and resistor combinations for application in small power-transformer installations have been announced by Schweitzer & Conrad, Inc., Chicago. In the majority of generating and distributing stations alterating current is used for lighting and auxiliary service. Suitable protec-



tive apparatus is now available in the form of the S.&C. resistor fuse which limits the short-circuit current that may be released to values that are quite low.

This equipment can be readily inspected at all times without removing any part of the device. The resistor is dust-proof, and the equipment can be supplied for either indoor or outdoor service.